ORDER NO. KM68902263C2

Service Manual

Electronic Typewriters

KX-R193/195

Panasonic

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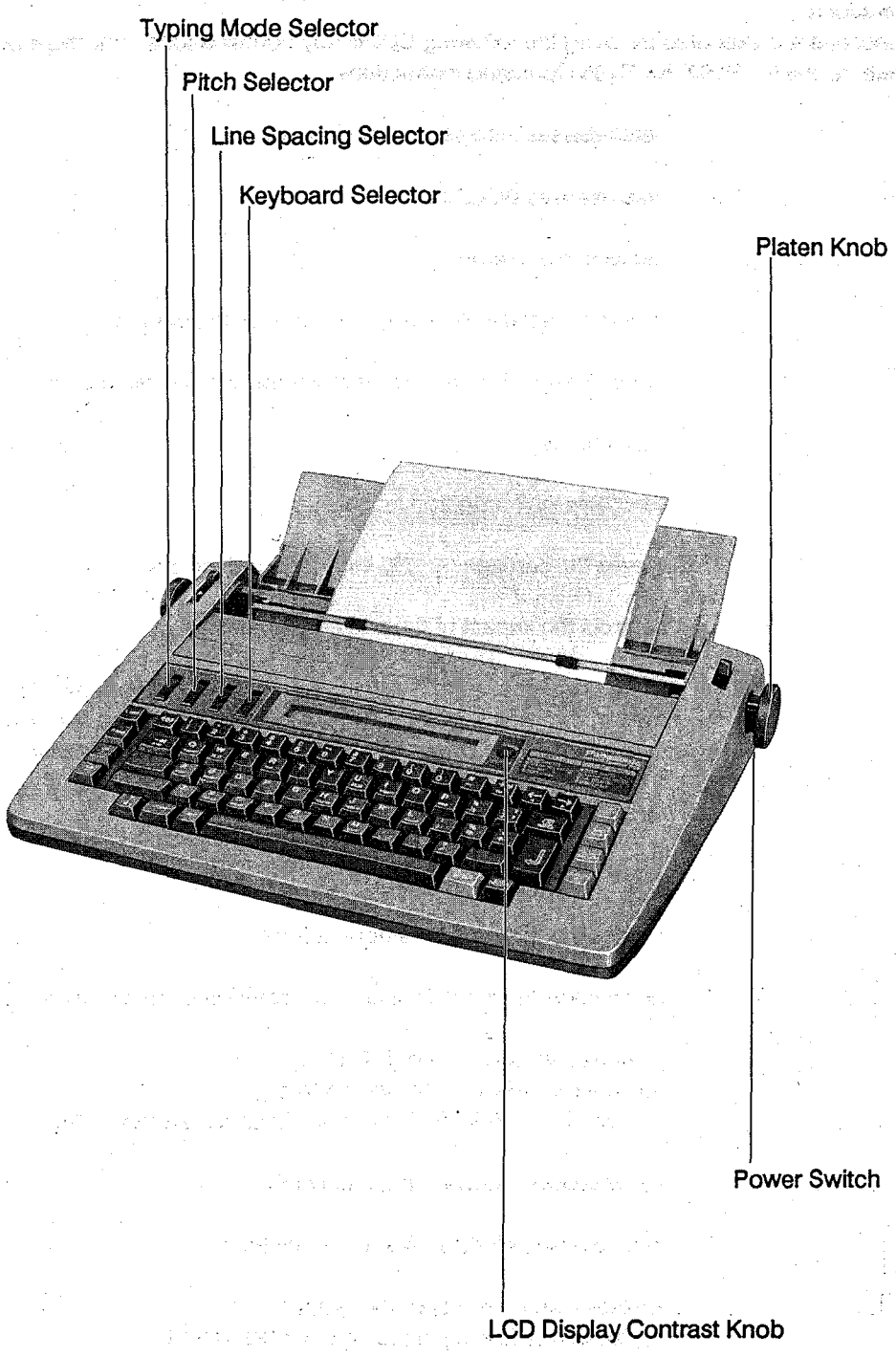
1. General Information

1.1 Specifications

		KX-R193	KX-R195
Print Unit	Print Speed	12 cps	
	Print Element	Cassette type Daisywheel (Mono Plastic) 96 characters	
	Typing Pitch	10, 12, 15	
	Line Spacing	1, $1\frac{1}{2}$, 2	
	Paper Width	12" (304 mm)	
	Writing Line	10" (254 mm)	
	Paper Capacity	Original + 1	
	Ribbon Cassette	Correctable, Fabric (Option)	
	Correction Tape	Lift-off, Cover-up (Option)	
Keyboard		46 Alpha/Numeric keys	
Memory	Correction Memory	1 line	
	Text Memory	7,000 characters	—
	Address List / Phrase / Text Memory	—	14,000 characters
	Line Formats	1 format	
	Battery Backup	5 years (Approx.)	
Display	Type	5×7 dot matrix LCD and 7 segment for column counter	
	Number of chrs.	14 characters	30 characters
Interface		Parallel (Centronics) with optional Interface Adaptor KX-R60 (receive only)	
Power Requirements	Voltage	240 V±10%	
	Frequency	50 Hz	
	Power Consumption	35 W	
Operating Conditions	Temperature	5°C (41°F) to 35°C (95°F)	
	Humidity	20%~80% RH	
Dimensions		$16\frac{13}{16}$" (W)×$14\frac{3}{8}$" (D)×$4\frac{3}{8}$" (H) (427×365×112 mm)	
Weight		Approx. 11.4 lbs. (5.2 kg)	

Specifications are subject to change without notice.

1.2 Function Key Location



1.3 List of Code Key Functions

The KX-R193/195 Electronic Typewriter has many functions for user operations and service operations.

a) User operations
These functions are executed by using the following CODE Key combinations. For more detailed information please refer to the KX-R193, KX-R195 Operating Instructions.

CODE + A (AUTO) ..... sets/releases auto carrier return mode

CODE + B (BOLD) ..... sets/releases BOLD print

CODE + C (CENTRE) ..... centers information

CODE + E ..... sets the machine to be used as a printer to print data from a computer

CODE + F ..... stores Margin Format and changes Margin Format in a text

CODE + H (HALF SP) ..... Half spacing

CODE + I (P INDENT) ..... sets/releases Paragraph Indent

CODE + J (MICRO SP) ..... moves the carriage by 1/60 inch (Micro-Pitch Spacing)

CODE + L (IMPRESS) ..... controls the impact of the printed characters

CODE + M (BLOCK) ..... moves, copies and deletes information block in a text [KX-R193]
moves, copies and deletes information block in a text sets a separate mark between the first name and the last name in an Address List [KX-R195]

CODE + N ..... renames texts

CODE + P (STOP) ..... sets a Stop Code in a text

CODE + Q (QUANTITY) ..... checks the remaining memory quantity

CODE + R (RIGHT) ..... prints information with the last character on each line aligned at the right margin

CODE + S (SEARCH) ..... searches words in a text [KX-R193]
searches words in a phrase or a text
searches only "NAME" terms in an Address List [KX-R195]

CODE + U (UNDERLINE) ..... sets/releases Continuous Underlining

CODE + W (WORD UNDERLINE) ..... sets/releases Word by Word Underlining

CODE + X (REPLACE) ..... replaces words in a text [KX-R193]
replaces words in a phrase or a text [KX-R195]

CODE + *1-20* → ↵ ..... recalls/stores phrase memory [KX-R195]

CODE + ← ..... scrolls backward through the first characters of each line in a test [KX-R193]
scrolls backward through the first characters of each line in a phrase or a text
moves to the "NAME" term of previous record [KX-R195]

CODE + → ..... scrolls forward through the first characters of each line in a text [KX-R193]
scrolls forward through the first characters of each line in a phrase or a text
moves to the "NAME" term of next record [KX-R195]

CODE + TEXT CLR ..... makes correction manually in normal mode/clears texts [KX-R193]
makes correction manually in normal mode/clears phrases, texts or records [KX-R195]

CODE + # ..... Permanent Hyphen

CODE + Space Bar ..... Permanent Space

CODE + D.TAB ..... aligns decimal points at the preset tab stops

CODE + TAB ..... clears all tabs and margins

CODE + ↵ ..... searches the return mark while executing the word search command or the word replace command

CODE + ° ..... presets the unit for typing capital letters, lower case numbers, punctuation marks and symbols

CODE + ↓ ..... locates next position of the word being searched [KX-R193]

CODE + ⤓ ..... locates next position of the word or the "NAME" term being searched [KX-R195]

SHIFT + ⤓ ..... moves the paper down 1/2 line [KX-R195]

CODE + PRINT ..... stores information without printing or carriage movement [KX-R193]

SHIFT + RELOC ..... moves the carrier to the end of the line without line spacing [KX-R195]

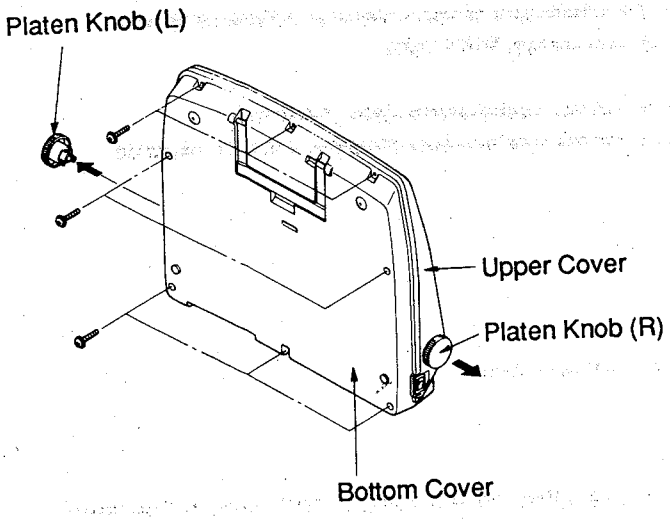
b) Service operations

The following functions are for supporting service and are executed by turning ON the Power Switch while pressing the Key combinations shown below.

		Display Message
SHIFT + RPT	Daisy home position is adjusted	"DAISY ADJ."
SHIFT + TAB	Check of ROM and RAM	"ROM/RAM CK"
EXP + RELOC	Test data printing	"TEST PRINTING" [KX-R193]
AUTO COLUMN + ADDRESS	Test data printing	"TEST PRINTING" [KX-R195]
SHIFT	Demonstration	"TEST PRINTING"
SHIFT + CODE	Clears all tabs, margin and RAM	Not displayed

2. Removal and Replacement Procedures

For reasons of safety and to avoid possible damage to electronic components, the AC Line Cord must be removed before disassembly.

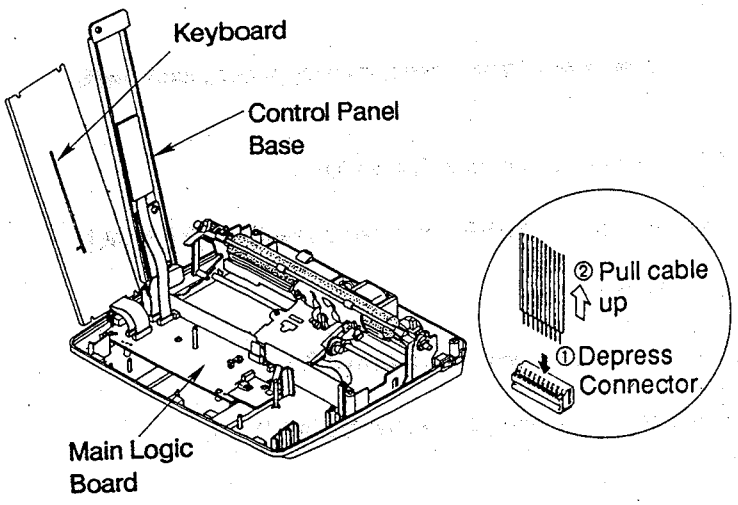


2.1 Upper Cover

1) Remove the Platen knobs from both sides of the Platen.
2) Remove 3 screws from beneath the front edge of the Bottom Cover, 2 screws from the middle of the Bottom Cover and 3 screws from the rear.
3) Carefully lift and remove the Upper Cover while observing the right side of the Platen shaft.

Replace in the reverse order.

Note:
When reinstalling the Upper Cover, the tab located on the Control Panel Base center must be engaged with hook located on the Upper Cover center.

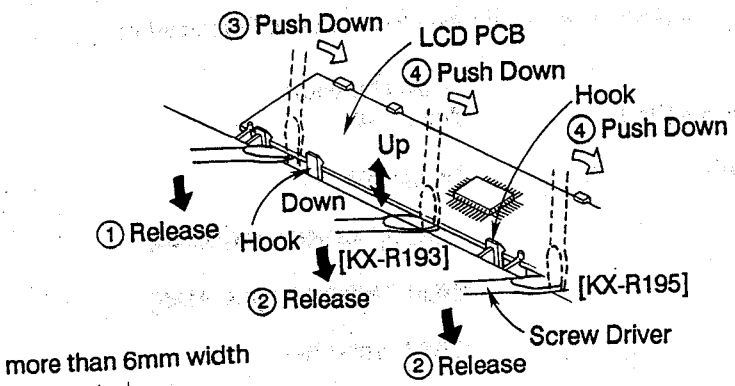


2.2 Keyboard and Control Panel Base

1) Unplug the Keyboard flat cables CN5 and CN6 from the Main Logic Board.
2) Unplug the LCD Display flat cable CN7 and the Selector Keys flat cable CN8 from the Main Logic Board.

Important Note:
Special clamping connectors are used for the LCD Display flat cable CN7 and the Selector Keys flat cable CN8. To avoid cable damage, depress the connector when removing the flat cable.

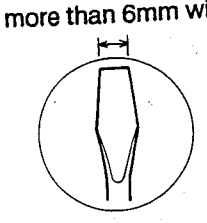
Replace in the reverse order.

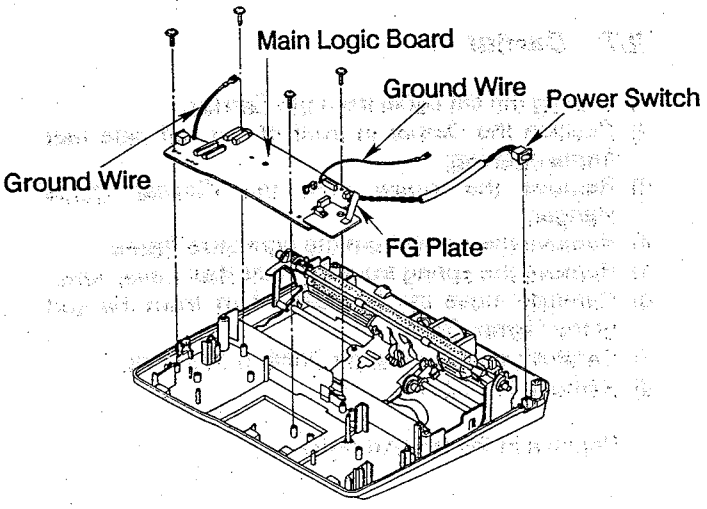


2.3 LCD Display

1) Turn the Keyboard over.
2) Pry up each side of the LCD PCB using a screw driver as illustrated at points 1 and 2.

Install the LCD PCB using a screw driver and push as illustrated at points 3 and 4.

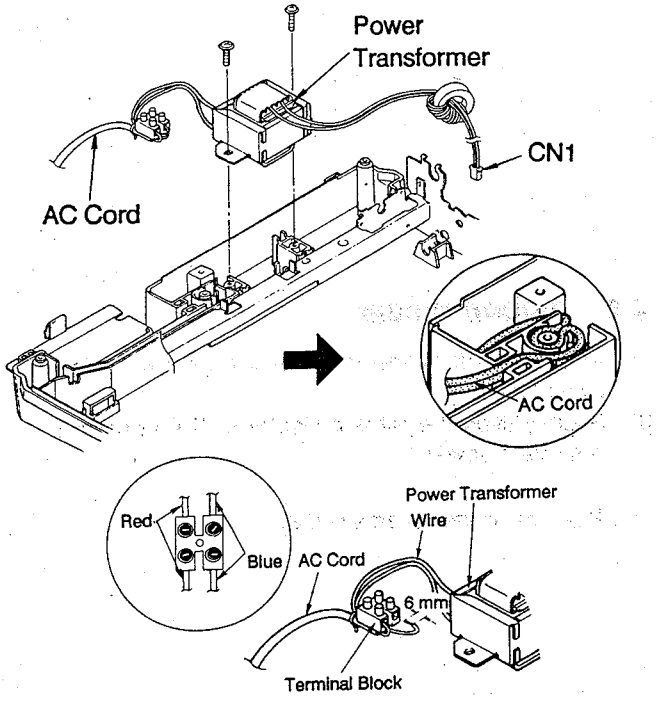




2.4 Main Logic Board

1) Unplug the Power Transformer connector CN1, the Carrier Spacing Motor connector CN2, the Paper Feed Motor connector CN4 and the Carrier flat cable CN3 from the Main Logic Board.
2) Remove the 2 ground wire screws from the Chassis.
3) Remove the 4 screws (◁⊖) and lift out the Main Logic Board with the Power Switch.
   Note:
   When reinstalling the Main Logic Board, make sure that the FG Plate makes contact with the bottom of the Keyboard Frame to prevent RF interference.

   Replace in the reverse order.

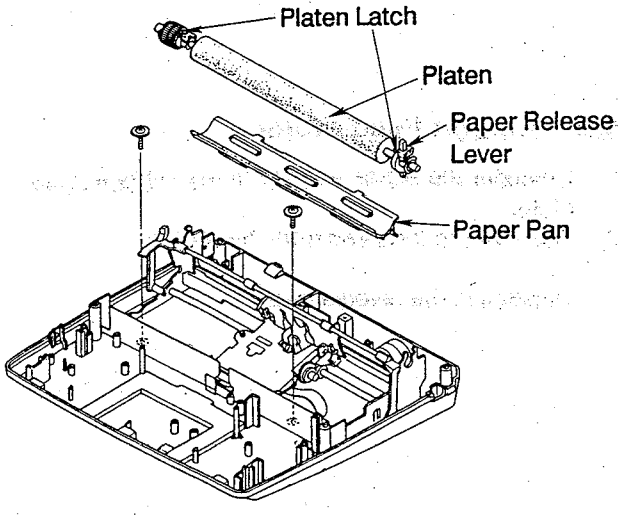


2.5 Transformer and AC Power Cord

1) Remove the 2 screws from the Power Transformer.
2) Release the AC Cord from the Bottom Cover.
3) Remove the Power Transformer with AC Cord.

   Replace in the reverse order.
   Note:
   When replacing the AC Cord, make sure that it is routed as shown in the illustration.

Safety Notice:
When replacing the Power Transformer and AC Cord, please follow the procedure below.
1) Carefully strip the lead ends.
2) Fully insert the same color wire end into the Terminal Block.
3) Firmly secure the screws.

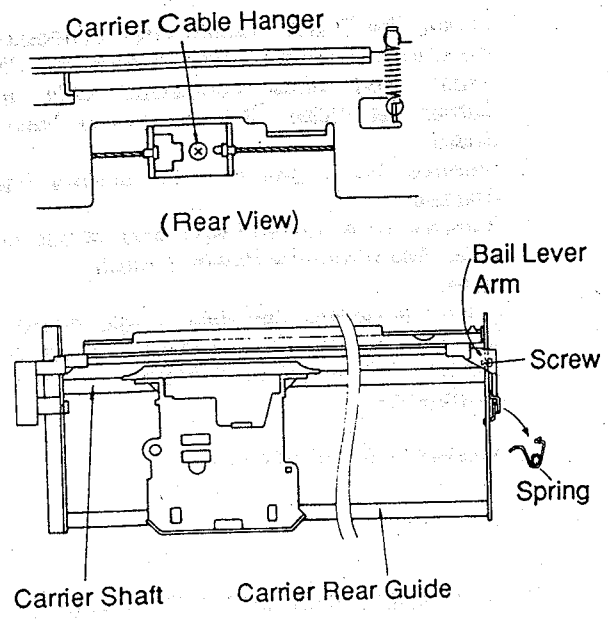


2.6 Chassis

1) Pull the right Paper Release Lever and remove the Platen by rotating the Platen Latches toward the front of the unit then lift the Platen from the Chassis.
2) Remove the Paper Pan.
3) Remove the 2 screws from the Chassis.
4) The Chassis can be removed.

   Replace in the reverse order.

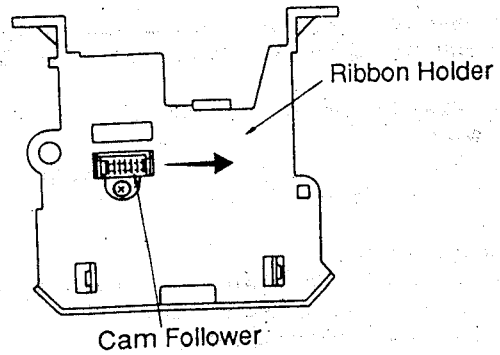
   Note:
   Connectors CN2, CN3 and CN4 must be unplugged before lifting the Chassis.
   (refer to section 2.4)



2.7 Carrier

1) Unplug the flat cable from the Carrier.
2) Position the Carrier in front of the left side rear frame opening.
3) Remove the screw from the Carrier Cable Hanger.
4) Remove the screw from the right side frame.
5) Remove the spring from the right Bail Lever Arm.
6) Carefully move the Bail Lever Arm from the end of the Carrier Shaft.
7) Carefully slide the Carrier Shaft to the right.
8) Remove the Carrier.

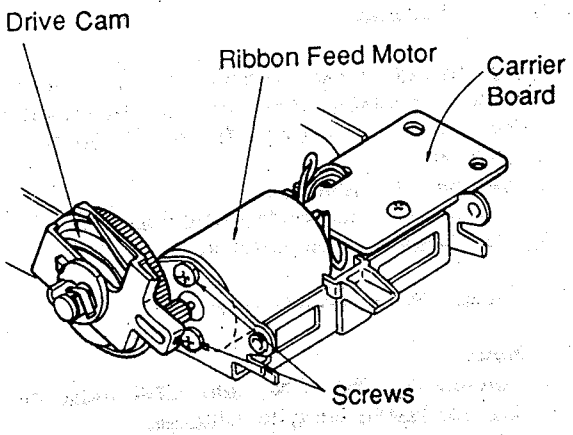
Replace in the reverse order.



2.8 Ribbon Holder

1) Pull the Cam Follower out of the groove in the Drive Cam.
2) Slightly slide the Ribbon Holder to the right and remove it upward.

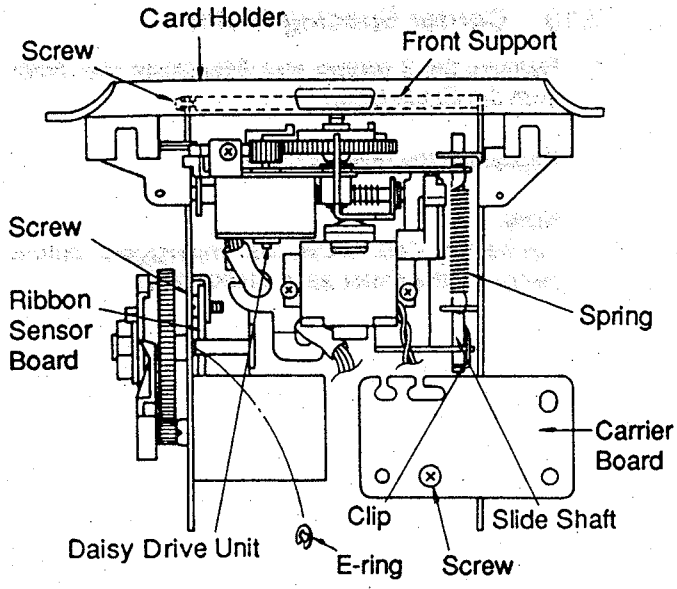
Replace in the reverse order.



2.9 Ribbon Feed Motor

1) Unsolder the Motor leads from the Ribbon Feed Motor.
2) Remove the 2 screws from the Motor.

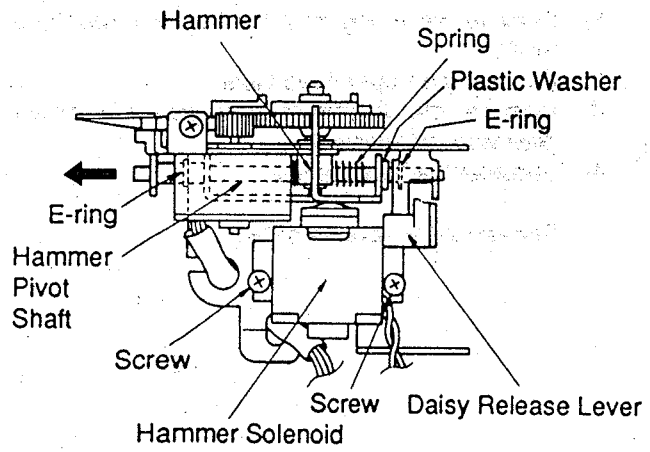
Replace in the reverse order.



2.10 Daisy Drive Unit

1) Remove the Front Support and the Card Holder by removing the screw.
2) Remove the E-ring and the Drive Cam.
3) Remove the screw from the Ribbon Sensor Board.
4) Remove the screw from the Carrier Board.
5) Remove the spring.
6) Remove the Clip from the Slide Shaft.
7) Remove the Slide Shaft by pulling it to the front.
8) Carefully lift off the Daisy Drive Unit, Carrier Board and Ribbon Sensor Board together.

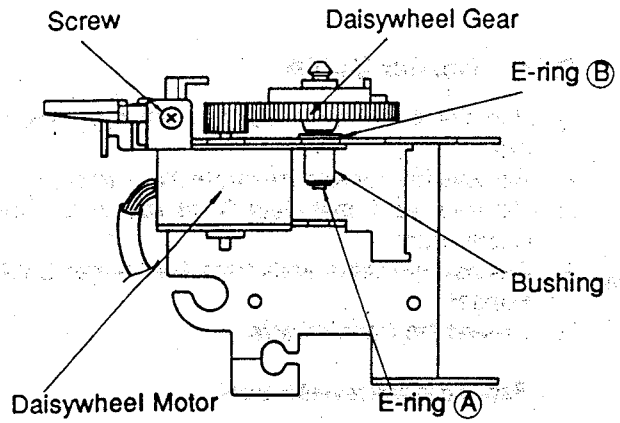
Replace in the reverse order.



2.11 Hammer and Hammer Solenoid

1) Remove the E-rings from the Hammer Pivot Shaft.
2) Slide the Shaft to the left and remove the Hammer with the plastic washer and spring.
3) Remove the 2 screws from the Hammer Solenoid.
4) Remove the Solenoid.
5) Unsolder the Solenoid leads from the Carrier Board.

Replace in the reverse order.

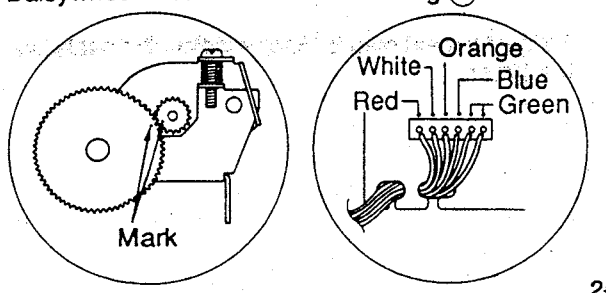


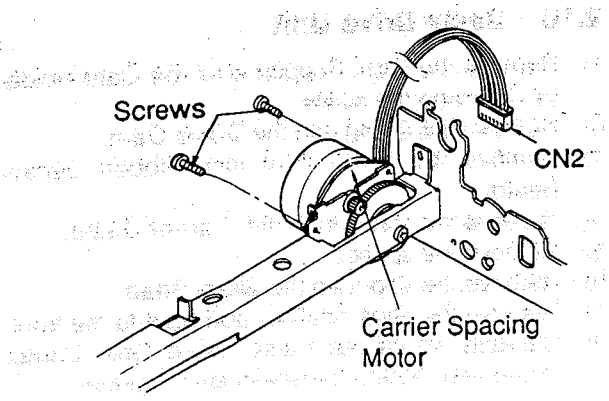
2.12 Daisywheel Motor

1) Remove the E-ring Ⓐ from the Daisywheel Gear Shaft.
2) Pull the Daisywheel Gear forward to remove.
3) Remove the screw from the Daisywheel Motor.
4) Remove the E-ring Ⓑ from the Daisywheel Shaft bushing.
5) Remove the Bushing.
6) Remove the Motor.
7) Unsolder the Motor leads from the Carrier Board.

Replace in the reverse order.

During replacement check the following:
- Make sure that leads match with indicated color as shown in the figure.
- Make sure that the marks on the two Daisywheel Drive Unit Gears are aligned.



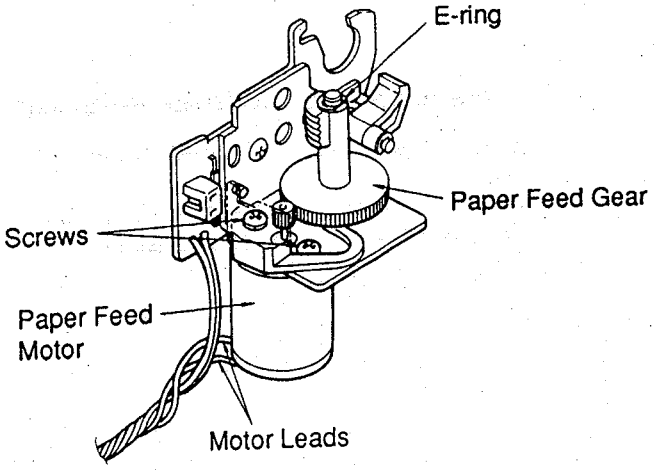


2.13 Carrier Spacing Motor

1) Remove the 2 screws and disengage the motor from the Cable Drum.

Replace in the reverse order.

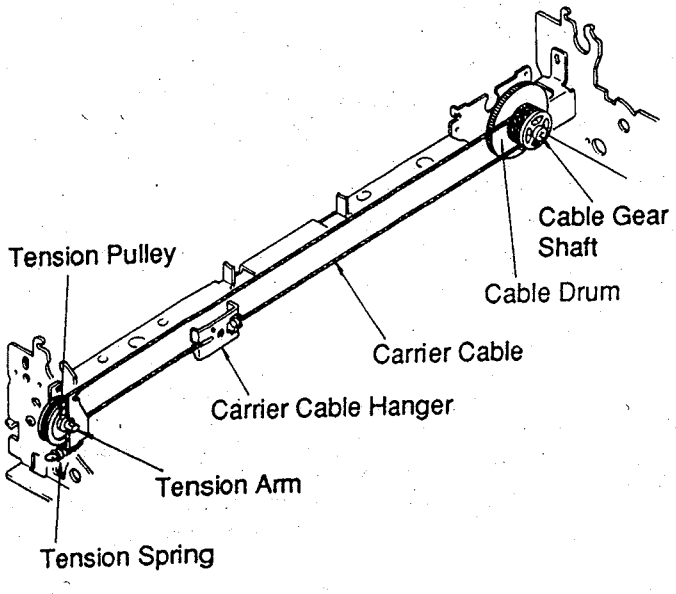
Note:
Connector CN2 must be unplugged before removing the motor as in section 2.3.



2.14 Paper Feed Motor

1) Remove the E-ring from the Paper Feed Gear Shaft.
2) Remove the Paper Feed Gear.
3) Remove the 2 screws and pull the Motor downward to remove it.
4) Unsolder the Motor leads.

Replace in the reverse order.



2.15 Carrier Cable

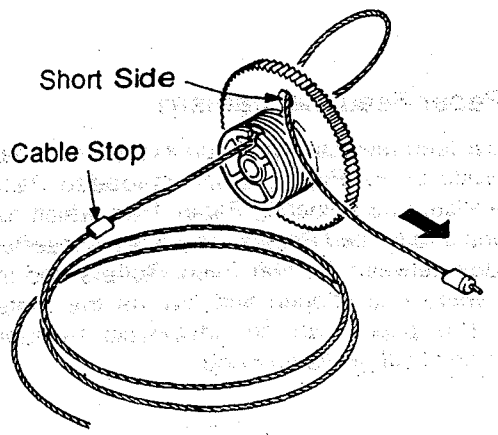
1) Remove the Tension spring from the Tension Arm.
2) Remove the Tension Arm from the frame.
3) Remove the Cable Gear Shaft screw and the Cable Drum.
4) Release the cable ends from the Carrier Cable Hanger.
5) Unwind the Carrier Cable.

Replace in the reverse order.

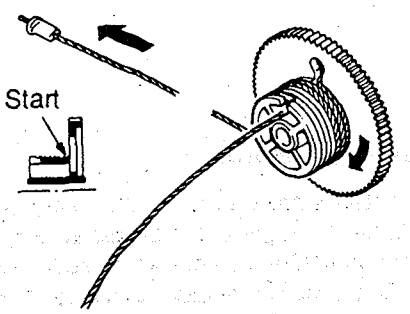
Follow the next step 2.15 for winding the cable on the Drum.

2.16 Carrier Cable Winding

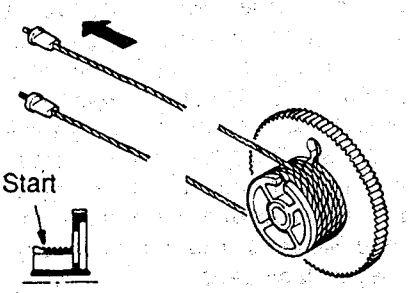
Note:
Use of Carrier Cable Jig No. PJZXXR250M will make cable installation much easier, as illustrated.



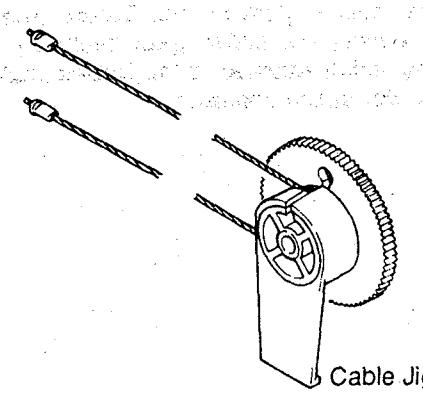
1) Insert the short end of the cable through the lower hole and back through the upper hole, pulling until the cable stops.



2) Wind the short cable end 3 full turns clockwise around the drum, starting in the first groove and hold while proceeding with Step "3".



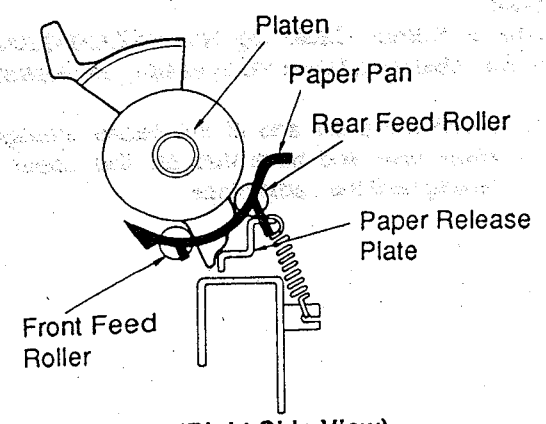
3) Wind the long cable end 4 full turns counterclockwise around the drum, starting in the first groove from the outside, and hold.



4) Slide the Carrier Cable Jig onto the drum, as illustrated, with the cable ends through the Jig opening.

Note:
- The cable can be held in place with tape if the Jig is not available.
- Pull the Carrier Cable Jig downward to remove.

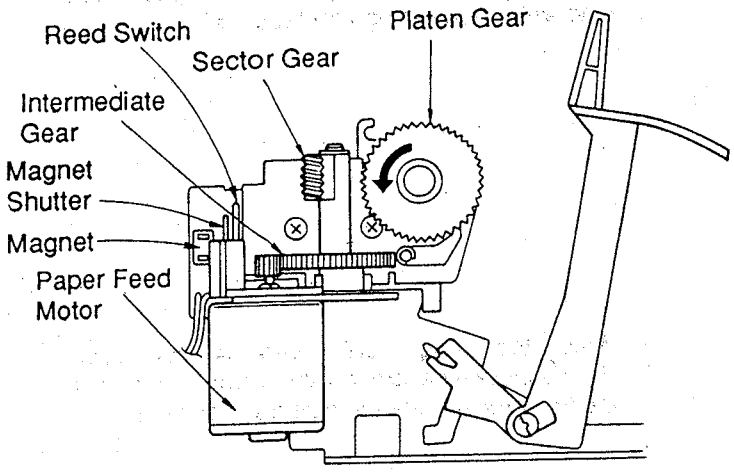
3. Mechanical Functions and Adjustments



(Right Side View)

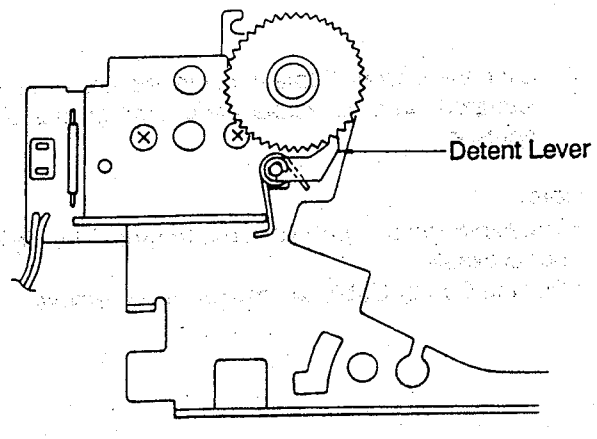
3.1 Paper Feed Mechanism

The paper feed mechanism, mounted on the Chassis, consists of the Platen, a spring-loaded Paper Release Plate and a floating Paper Pan which has 3 front and 3 rear Feed Rollers. As paper is inserted, it is guided between the rear Feed Rollers and the Platen, where it is gripped and fed as the Platen rotates. The paper can be advanced manually through use of either Platen Knob.



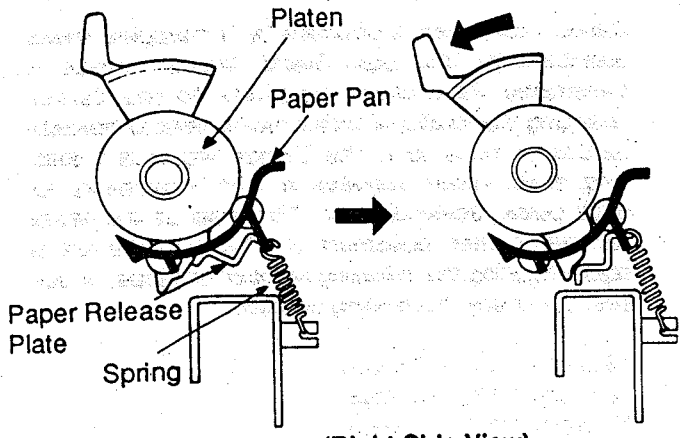
3.2 Paper Feed Motor

Drive for the Platen is provided by a DC motor, which rotates the Platen through a Sector Gear engaged with the Platen Gear. One complete revolution of the Intermediate Gear and Sector Gear provides 1/2 line space movement to the Platen. As the Motor is energized, it begins to rotate counterclockwise (viewed from the top) and its Gear causes the Intermediate Gear to rotate clockwise, bringing the Sector Gear into engagement with the Platen Gear and advancing the Platen. The Home Detecting Lever is activated by Cam rotation and the Magnet Shutter mounted on the top of the Home Detecting Lever turns the Reed Switch off. The Motor and Gear continue to turn through momentum until a full revolution has been completed. After rotation is completed, Platen position is maintained by a spring-loaded Detent which is engaged with the Platen Ratchet. The Paper Feed Motor is actuated whenever the Carrier return key is depressed.



3.3 Line Space Detent

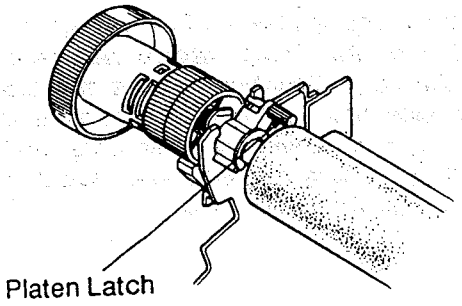
After each line space operation, the Detent Lever is fully seated between 2 platen gear teeth by the tension of the spring attached to the Detent shaft to obtain proper line space operation.



(Right Side View)

3.4 Paper Release Mechanism

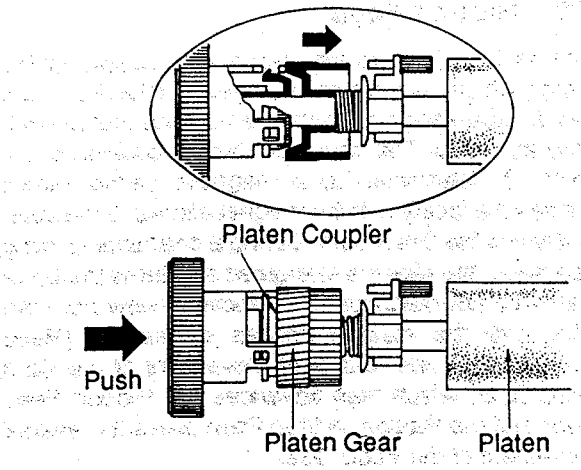
The Feed Roller and Paper Pan assembly is held against the Platen by the tension of 2 coil springs attached to a Paper Release Plate.
Pulling the Paper Release Lever forward causes the Paper Release Plate to move downward, increasing the tension on the coil springs and allowing the Feed Rollers to move away from the Platen.



3.5 Platen Latches

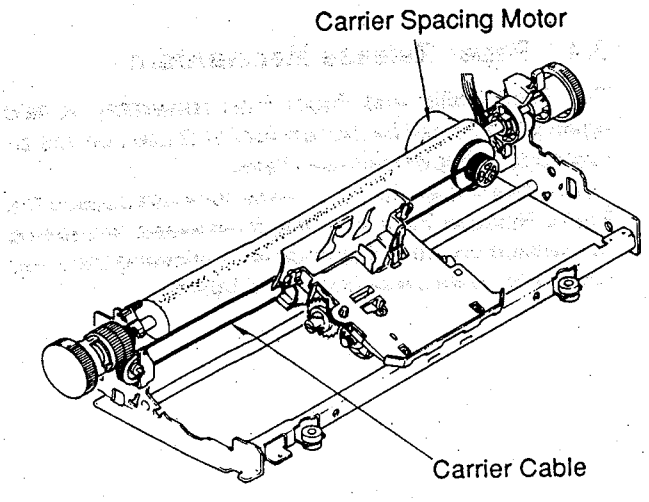
The Platen is held securely in place by molded plastic rotary clamps installed on both ends of the platen. The design of the Latches provides secure latching without the need of adjustment, and permits easy Platen removal and replacement.

Note:
Hold the Paper Release Lever vertical when replacing the Platen.



3.6 Platen Variable Clutch Mechanism

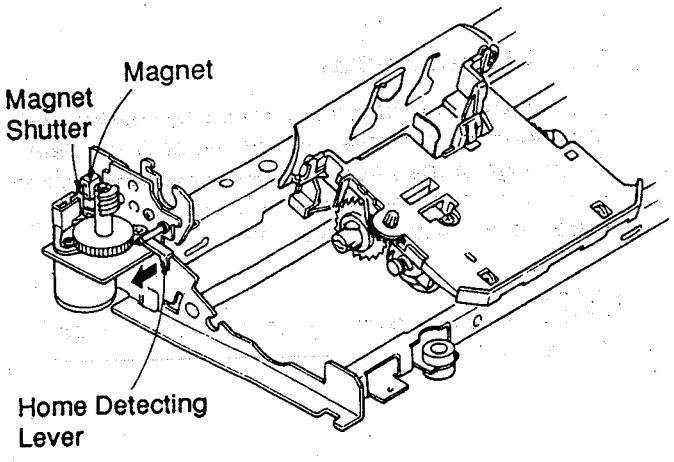
Normally rotational movement of the Platen Knob transmitted directly to the Platen, causes the engaged Platen Gear to turn, limiting Platen movement to 1/2 space (1 tooth) increments. When the left Platen Knob is pushed to the right, the spring loaded Platen Gear is moved to the right, disengaging its clutch teeth from those inside the Platen Coupler, and allowing Platen rotation without turning the Platen Gear. This permits Platen movement in very small increments.



3.7 Carrier Spacing

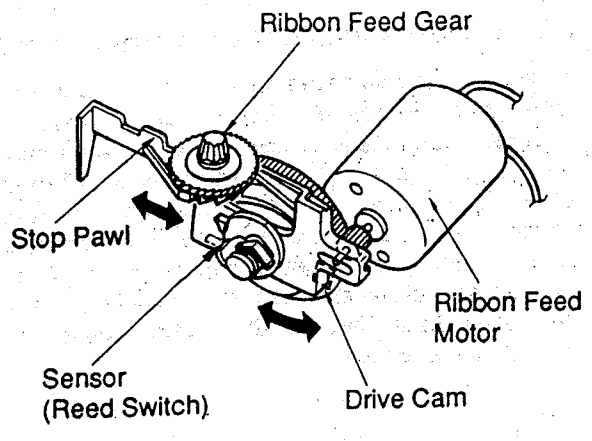
Carrier movement is provided by a stepping motor controlled by the Logic Board. Motor rotation is transmitted via a cable and pulley to the Carrier, changing the rotational motor movement to horizontal Carrier movement. The Carrier Motor is a stepping motor which operates in 7.5° increments for each pulse received. Each 7.5° step of the Motor provides carrier movement of 1/120" to the left or right, requiring the following number of steps, or pulses, per space, depending on pitch:

15 pitch= 1/15" = 8 steps
12 pitch= 1/12" =10 steps
10 pitch= 1/10" =12 steps



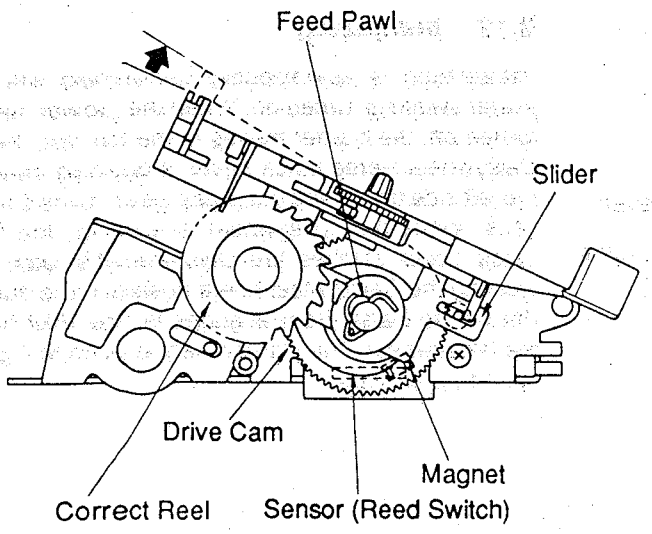
3.8 Carrier Home Sensor

The chassis is equipped with a limit Sensor to notify the CPU when the Carrier approaches its home position, the Home Detecting Lever is activated by the Card Holder and the Magnet Shutter mounted on the top of the Home Detecting Lever turns the Reed Switch off, generating the signal and indicating the carrier home position to the CPU.



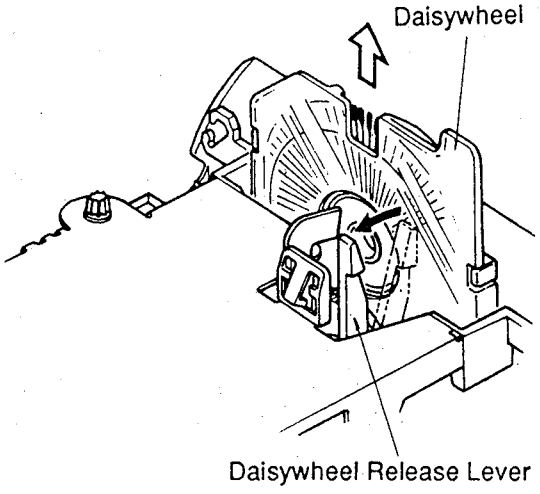
3.9 Ribbon Feed

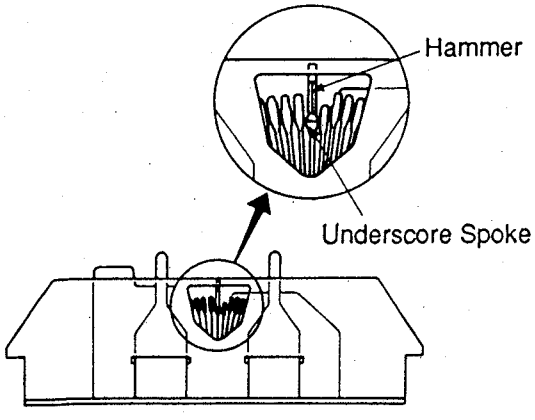
Ribbon Feed Drive is provided by a bi-directional DC motor, which also provides Correction Tape Lift and Feed, depending on which direction the motor is initially activated. The home, or starting position of the motor is determined by a magnetic sensor which senses the location of the magnet affixed to the inner surface of the Drive Cam. During a character printing operation, the Motor is energized and turns the Drive Cam in a counterclockwise direction (view from the left), until the magnet passes its sensor (Reed Switch). This one rotational movement of the Cam Feed Gear, which then advances the Ribbon Feed Gear and the Ribbon. A Stop Pawl prevents reverse movement of the Feed Gear.



3.10 Correction Tape Feed

During a correction operation the Motor is energized, turning the Drive Cam in a clockwise direction approximately 180°, until the magnet passes its sensor (Reed Switch), at which time it reverses direction and returns to its home position. The Drive Cam's rotational movement is changed to vertical movement by the Cam Follower in the eccentric groove on the back of the Drive Cam, lifting the Ribbon Holder to its upper position. As the Motor lifts the Holder to its upper position, the tip of the Feed Pawl which pivots on the Slider engages the Feed Gear and continues upward movement causing the Feed Gear to be advanced by one tooth. The Stop Pawl (leaf spring) prevents reverse movement of the Correct Reel.





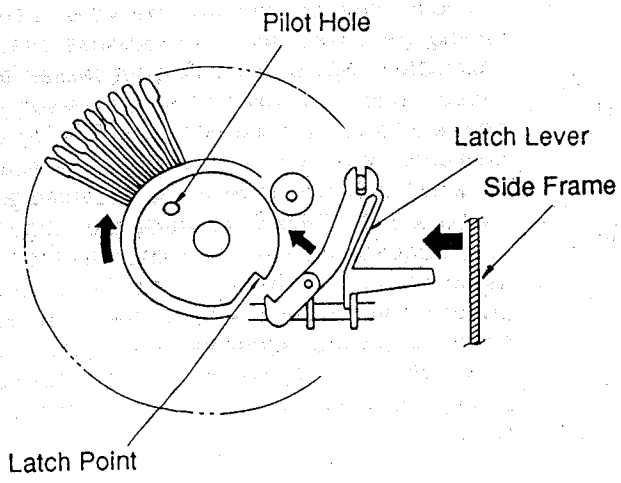
3.11 Daisywheel Motor and Character Printing

a) Daisywheel Motor

The Daisywheel Stepping Motor is mounted within the Carrier frame, and is controlled by the CPU. When a key is depressed, a signal is generated on the Main Logic Board, energizing the Motor and causing it to rotate to the desired point, step by step. Each step of the motor provides for 3.75° or one character spoke movement of the Daisywheel. The home position of the Motor corresponds to the underscore character on the Daisywheel being positioned at the printing point. In this position, the Impact Hammer must be aligned with the projection at the back of the underscore spoke. Pulling back on the Daisywheel Release Lever pushes down the Lock bar and moves the Motor away from the Platen. The Daisywheel Gear shaft and Pilot pin are disengaged from the Daisywheel, allowing the Daisywheel to the removed. Upon installation of the Daisywheel, pushing the lever forward firmly latches the Motor in the printing position. If the Pilot pin does not engage in the Pilot hole of the Daisywheel, it will re-engage automatically when the Carrier returns to the home position during initialization.

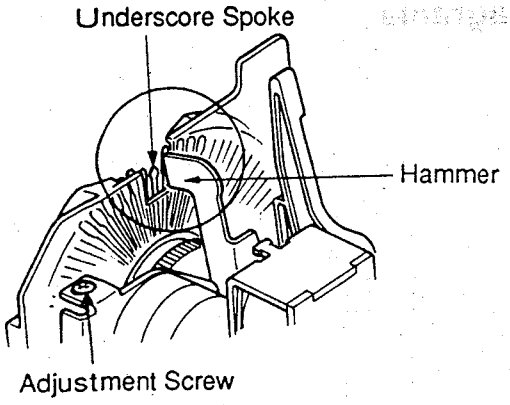
b) Character Printing

Once the Daisywheel has moved to the desired character, the Hammer Solenoid is energized by the CPU, causing the Hammer to move rapidly toward the Daisywheel, driving the character spoke into contact with the Platen. The strength of this impact is determined by the length of time the solenoid is energized, which is automatically controlled by the CPU corresponding to character surface area.



3.12 Initializing

Initialization is automatically performed when the power switch is turned on. When the power switch is turned on, the Carrier moves to the far left, then the Daisywheel Home Latch Lever is pushed inward by the left side frame and the Daisy Gear turns 2 revolutions. While the Daisywheel is turning, the Home Latch Lever catches the Daisywheel's latch point locating the Daisywheel home position and the Pilot Pin on the Daisy Gear engages in the Pilot hole in the Daisywheel. The Carrier then returns to the Carrier home position.

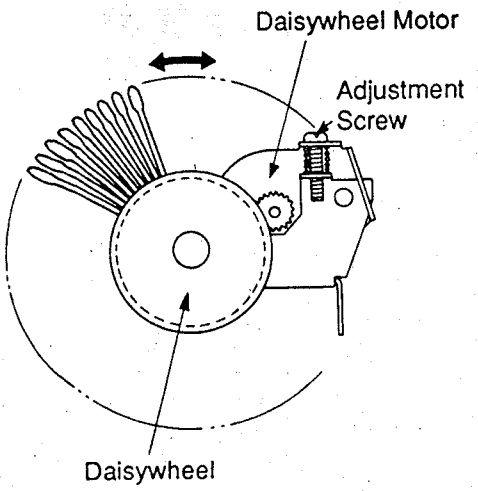


3.13 Daisy Home Position Adjustment

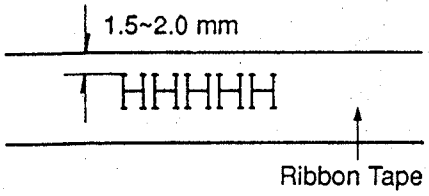
Each spoke must be directly aligned with the Hammer when its character key is depressed. If necessary or when installing a new motor, adjust as follows.

Important Note:

The Daisywheel Motor must only be adjusted in the "DAISY ADJ" mode with power supplied to the motor. In the "DAISY ADJ" mode the Daisywheel motor will be energized for 2 minutes, after that the display will read "PWR OFF/ON". This message will remain until the power is turned off.



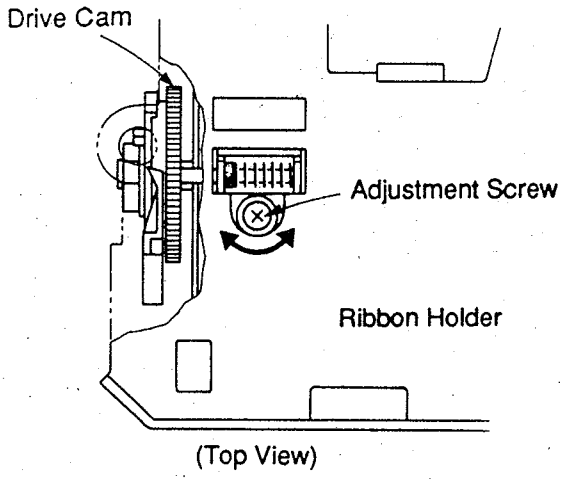
1) Install a Daisywheel and latch the motor in printing position.
2) Initialize the Daisywheel as in section 3.12.
3) Press the SHIFT + REPEAT keys and turn on the power at the same time. Display will read "DAISY ADJ".
4) Manually push the Hammer toward the Daisywheel, and observe the underscore spoke locator in relation to the Hammer groove. If the Hammer is not aligned with the underscore spoke, follow the next step.
5) Align the Hammer groove with underscore spoke locator by turning the Adjustment screw. After adjusting the position, observe the alignment by repeating steps 2) 3) 4).
6) Apply a locking compound to the Adjustment screw to prevent loosening.



3.14 Ribbon Lift Adjustment

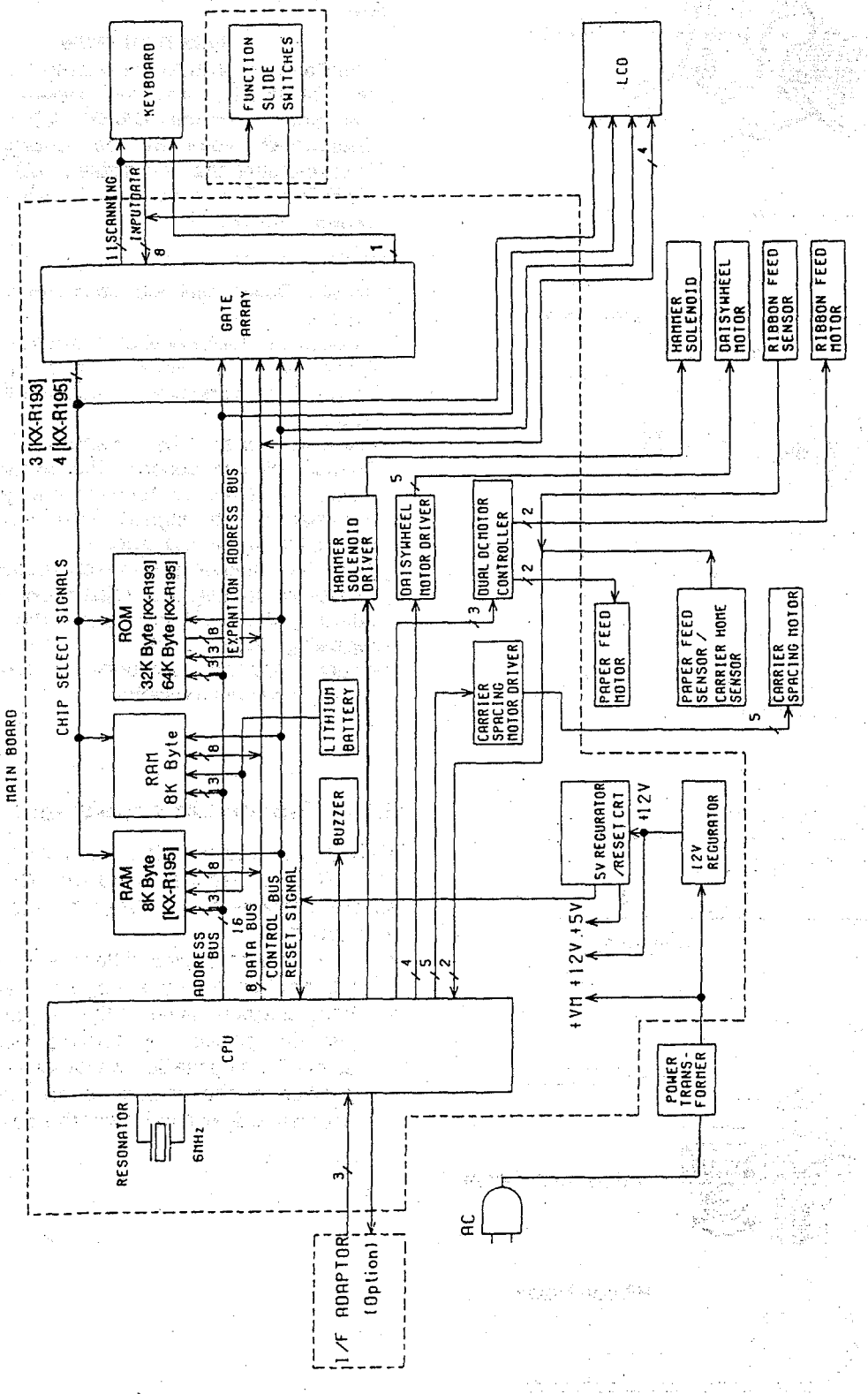
The typed character must strike near the upper edge of the Ribbon (See the illustration). Check by typing several characters and observing their position on the Ribbon.

1) The tops of capital letters should be 1.5 to 2.0 mm from the upper edge of the Ribbon.
2) If the character is not in the proper position, adjust the position by turning the adjustment screw. Turning the screw clockwise will raise the position of the characters on the ribbon and counterclockwise will lower the position.



4. Electronic Circuit Descriptions and Diagrams

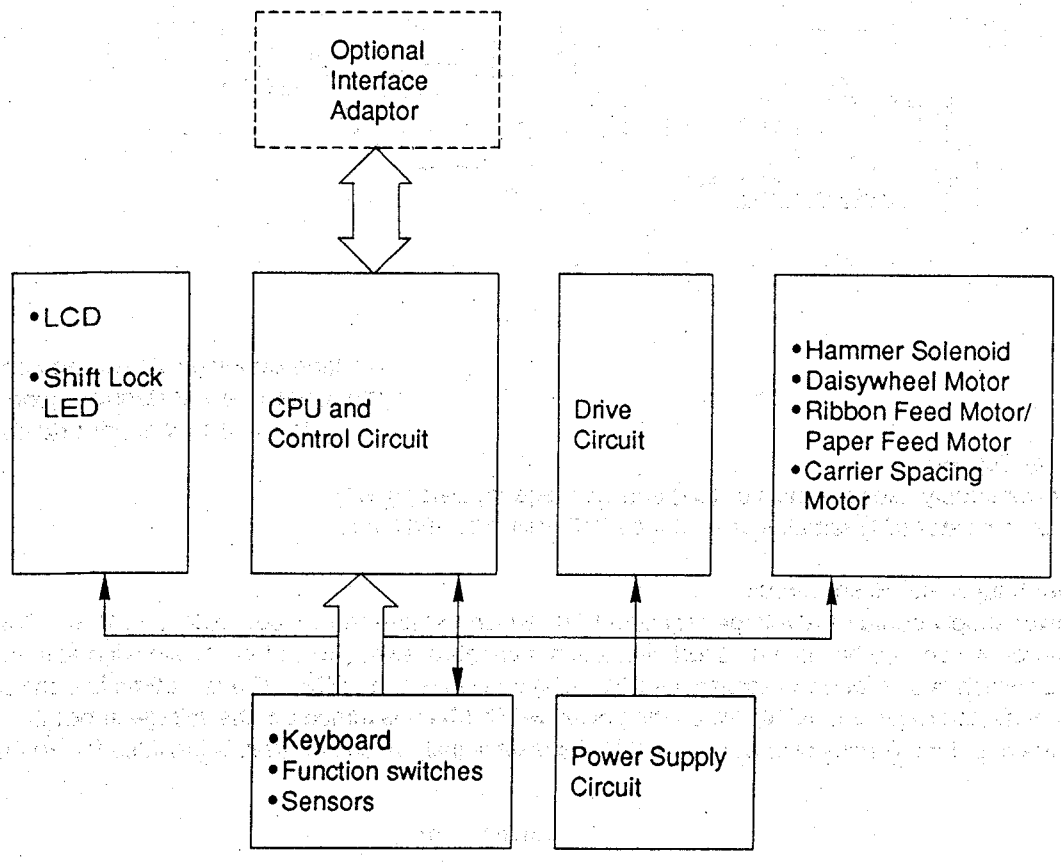
Block Diagram



4.1 Principle of Operation

This chapter explains the basic operation of the electronic circuitry for this typewriter.

This typewriter is mainly composed of control, drive, power supply circuits, motors, print hammer, keyboard, LCD display and sensors. The control circuit is composed of ROM, RAM, Gate Array and CPU. Four drive circuits drive the carrier spacing motor, the daisywheel motor, paper/ribbon feed motors and the hammer solenoid. The power supply circuit supplies necessary voltage for all circuits. The keyboard is composed of 46 character keys and 23 function keys. Two sensors are used for detecting mechanical movement. They are magntic sensors which are the ribbon feed sensor and the carrier home/paper feed sensor. The control panel is composed of four slide switches; the pitch selector, the line spacing selector, the typing mode selector and the keyboard selector. A14-character [KX-R193], A30-character [KX-R195] LCD display is used for the display.

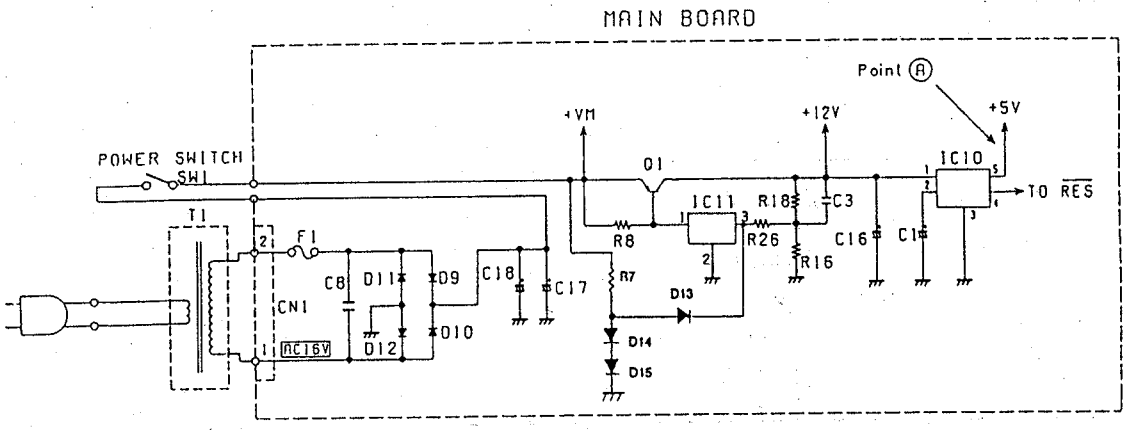


4.2 Power Supply

4.2.1 General Description

The 240 volt AC input is stepped down by transformer T1, rectified by diodes D9-D12 then filtered by C17 and C18. The filtered DC passes through the power switch SW1 and into the +12 volt and +5 volt regulator circuits.

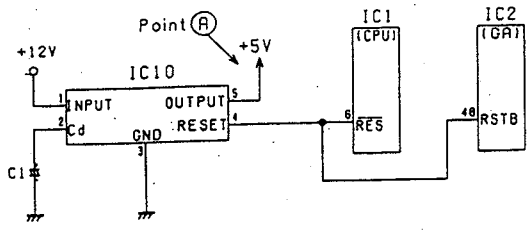
+VM -----Carrier Spacing Motor
+12 V ----Daisywheel Motor, DC Motors, Print Hammer, Buzzer
+5 V -----Logic Circuit



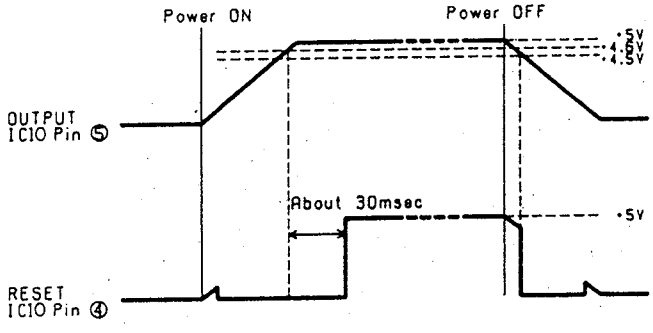
Voltage Condition: At standby condition
Note: VM = 19 V at standby condition
VM = 13-16 V at printing condition

a) +12 V Power Supply
The +12 V power supply uses a transistor (Q1) and a voltage regulator (IC11).
The collector of transistor (Q1) remains at +12 V by R18, R16, R26 and IC11.

b) +5 V Power Supply and Reset Circuit
The +5 V power supply contains a voltage regulator IC10, which reduces the voltage from +12 V to +5 V. This is a five pin device which also has built-in short circuit and thermal runaway protection. This device also contains the reset circuit which is provided to initialize the CPU (IC1) and Gate Array (IC2). The reset time is controlled by C1, which is connected to pin 2 of IC10. When the power switch (SW1) is turned on, the voltage at point (A) rises. After the voltage at point (A) rises over about +4.6 V, the reset signal, which is L level, is provided for 30 msec.



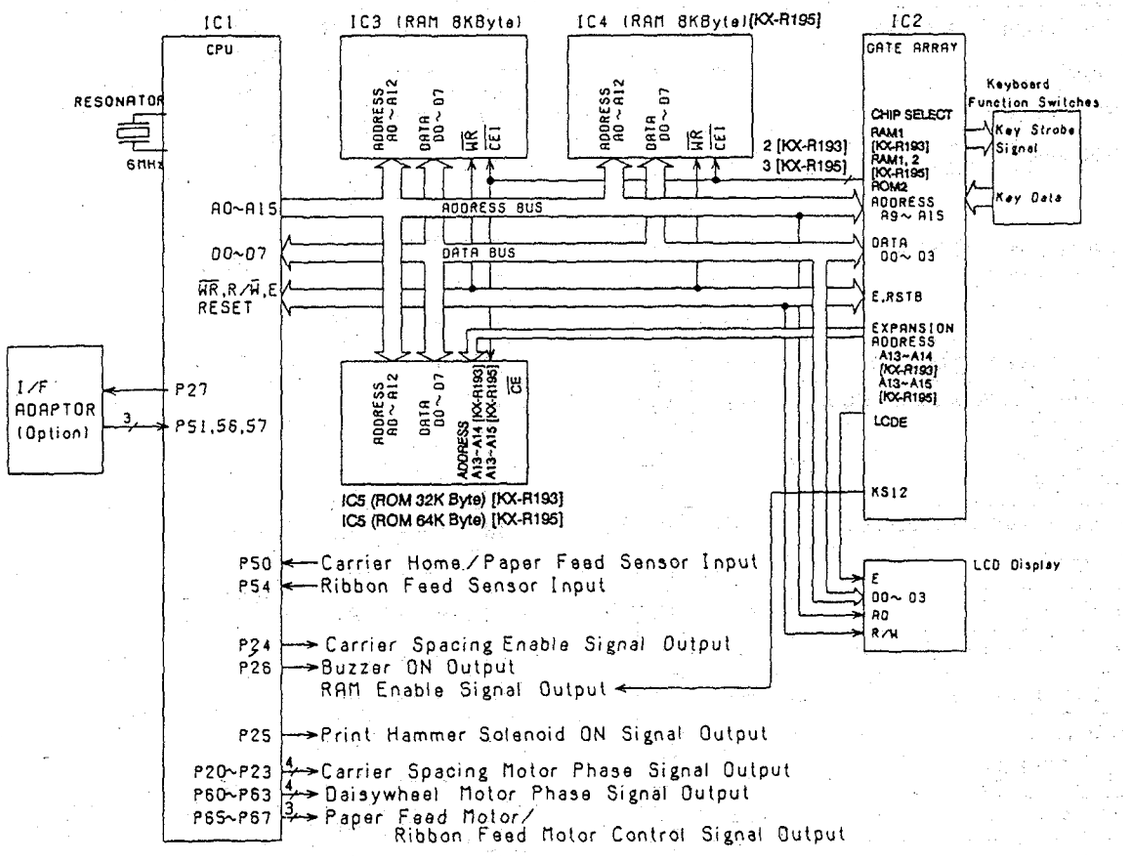
Timing Chart



4.3 CPU and Control Circuit

4.3.1 General Description

This block mainly consists of the CPU (IC1), ROM (IC5), RAM (IC3) [KX-R193], RAM (IC3, 4) [KX-R195], and the Gate Array (IC2). The CPU receives key data from the keyboard through the Gate Array (IC2), processes the input from various sensors and function switches and controls the daisywheel, paper feed, carrier spacing, ribbon feed motors and the hammer solenoid.



4.3.2 CPU

This typewriter is a microprocessor controlled. It is controlled by a HD63B03x CPU "Central Processing Unit" IC1. The CPU has full control over all machine functions. It controls the printer mechanism, keyboard scanning, the display and memory management. The pin names and functions are shown in the following chart.

NAME	FUNCTION			NAME	FUNCTION
Vss	GND	1	64	E	System Clock (1.5 MHz)
XTAL	RESONATOR Input (6 MHz)	2	63	RD	NC
EXTAL		3	62	WR	WRITE Signal
MP0	CPU Mode Select (+5V)	4	61	R/$\overline{W}$	R/$\overline{W}$ Signal
MP1	CPU Mode Select (0V)	5	60	LIR	NC
RES	Reset	6	59	BA	NC
STBY	Not used (+5V)	7	58	D0	Data Bus
NM1	Not used (+5V)	8	57	D1	
P20	Carrier Spacing Motor Phase Signal	9	56	D2	
P21		10	55	D3	
P22		11	54	D4	
P23		12	53	D5	
P24	Carrier Spacing Enable	13	52	D6	
P25	Print Hammer Solenoid ON Signal	14	51	D7	
P26	BUZZER	15	50	A0	Address Bus
P27	I/F ($\overline{ACK}$)	16	49	A1	
P50	Carrier Home/Paper Feed Sensor	17	48	A2	
P51	I/F ($\overline{STB}$)	18	47	A3	
P52	0 V	19	46	A4	
P53	+5 V [KX-R193], 0 V [KX-R195]	20	45	A5	
P54	Ribbon Feed Sensor	21	44	A6	
P55	Not used	22	43	A7	
P56	I/F ($\overline{ON\ LINE}$)	23	42	Vss	GND
P57	I/F (TXD)	24	41	A8	Address Bus
P60	Daisywheel Motor Phase Signal	25	40	A9	
P61		26	39	A10	
P62		27	38	A11	
P63		28	37	A12	
P64	0 V	29	36	A13	
P65	Paper Feed Motor/Ribbon Feed Motor Control Signal	30	35	A14	
P66		31	34	A15	
P67		32	33	Vcc	+5V

4.3.3 Memory Map and Expansion Memory

[KX-R193]
The CPU (IC1) can manage a 64K byte memory area. The CPU's memory area is divided and assigned for 192 byte internal RAM, 8K byte RAM (IC3) area, interface area, and 32K byte operating program area.

[KX-R195]
The CPU (IC1) can manage a 64K byte memory area but the KX-R195 needs a 104K byte memory area to operate. The memory area consists of the following: a 32K byte operating program area, a 32K byte special operating program area, 16K byte RAM area, and an I/O area.
The 64K byte management capability of the CPU is expanded by using two 8K byte windows. The expansion memory area consists of one 8K byte TEXT RAM area and a 32K byte special operating program area which is divided into four 8K byte blocks, each having its own address code. When the CPU writes one of these address codes into a BANK register, the CPU can access that memory block through the BANK window by means of the expansion memory decode circuit. For example, when the CPU writes "30" (data) into the BANK 1 register, the CPU can access block 1 in IC5 (64K byte ROM) through the BANK 1 window.
The CPU's remaining 48K byte memory area is divided and assigned for 192 byte internal RAM, 8K byte RAM (IC3) area, interface area, and 32K byte operating program area.

Memory Map (64K byte)

ADDRESS	Used For
0000 001F	Internal Register CPU (IC1)
0020 003F	Not used
0040 00FF	Internal 192 byte RAM CPU (IC1)
0100 0BFF	Not used
0C00 0DFF	Gate Array (IC2) Key Scan Register
0E00 11FF	Gate Array (IC2) Key Matrix Data Input
1200 15FF	Gate Array (IC2) Output Port
1600 19FF	Gate Array (IC2) BANK0 Selection Register
1A00 1DFF	Gate Array (IC2) BANK1 Selection Register
1E00 1FFF	LCD Display
2000 3FFF	8K byte RAM (IC3)
4000 5FFF	Not used [KX-R193] BANK0 (8K byte) Window [KX-R195]
6000 7FFF	Not used [KX-R193] BANK1 (8K byte) Window [KX-R195]
8000 FFFF	*32K byte ROM (IC5) Operating Program Area

Expansion Memory Map (40K byte)
[KX-R195]

IC4

BLOCK	CODE	NAME
0	18	8K byte RAM TEXT Memory Area

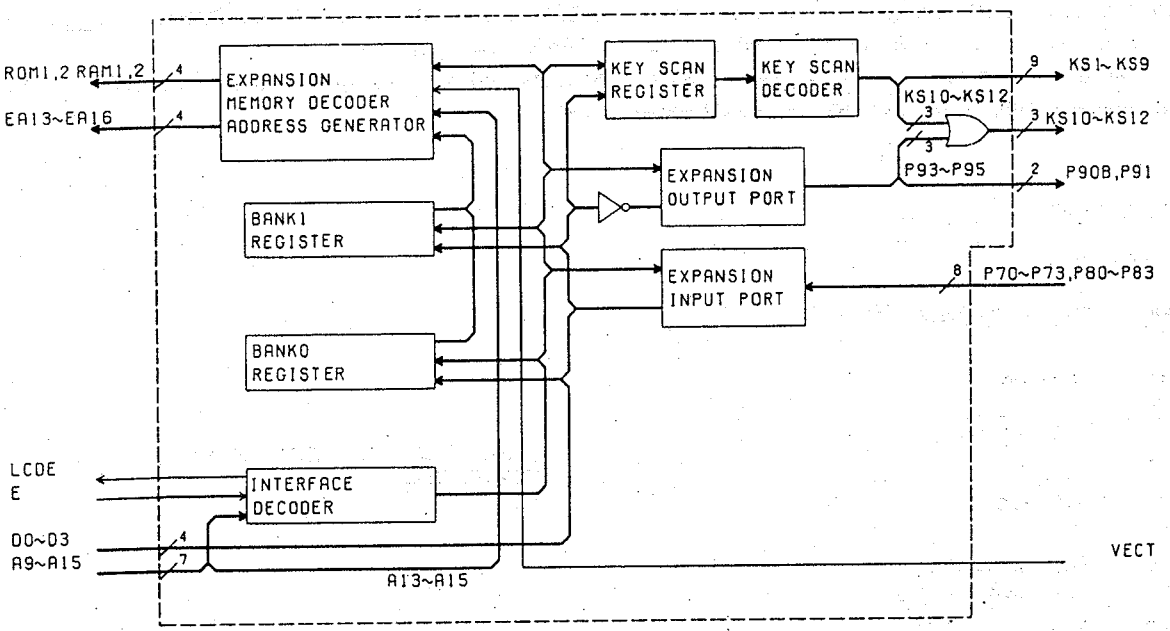
IC5
Top 32K byte In 64K byte

BLOCK	CODE	NAME
1	30	Address List Program Area 8K byte
2	32	Not used
3	34	Not used
4	36	Auto Column Program Area 8K byte

4.3.4 Gate Array

The Gate Array (IC2) is an original LSI which integrates complex circuits into 1 chip IC. Basically the Gate Array consists of 8 circuits. The key scan register, the key scan decoder and the expansion input port are used to sense the key data and slide switch positions. The expansion memory decoder, BANK 0 register and BANK 1 register are used to access expansion memory area (IC4, 5) [KX-R195]. The expansion output port is a 5 bit output port which is used for the RAM enable signal and shift lock. The interface decoder is used for to access other block circuits in the Gate Array, and access the LCD and 8K byte RAM (IC3).

Gate Array (IC2) Block Diagram



4.3.5 Memory Select

The Gate Array (IC2) has 4 memory select signal outputs for ROM1, 2 and RAM1, 2. The KX-R193 uses ROM2 and RAM1. The KX-R195 uses ROM2 and RAM1, 2. The memory select output signal is generated by the expansion memory decoder and the address generator which decode the address signals. When the CPU selects a memory chip, a low (L) active pulse signal is generated by the decoder then read or write is accomplished.

4.3.6 Gate Array Pin Function

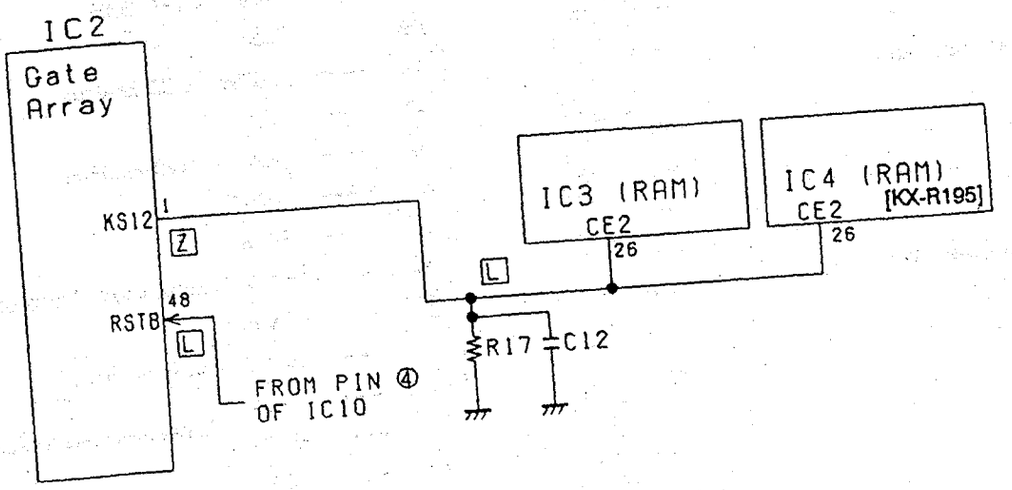
The Gate Array pin functions are shown in the following chart.

NAME	FUNCTION				NAME	FUNCTION
KS12	RAM Enable Signal	←	1	48	← RSTB	RESET
KS11	Key Scan Output with 3-state	←	2	47	→ P91	Shift Lock LED
KS10		←	3	46	← VECT	VECTOR
P80	Key Data Input	→	4	45	VDD	+5 V
P81		→	5	44	→ LCDE	LCD Enable
P82		→	6	43	← AD15	Address Bus
P83		→	7	42	← AD14	
P90B	NC	←	8	41	← AD13	
P70	Key Data Input	→	9	40	→ EA16	Expansion Address Bus
P71		→	10	39	→ EA17	
P72		→	11	38	→ EA15	
P73		→	12	37	← AD12	Address Bus
KS6	Key Scan Output With Open Drain	←	13	36	→ EA14	Expansion Address Bus
KS5		←	14	35	→ EA13	
KS4		←	15	34	← AD9	Address Bus
KS3		←	16	33	← AD11	
KS2		←	17	32	← AD10	
KS1		←	18	31	→ ROM1	NC
KS7		←	19	30	↔ DB0	Data Bus
KS8		←	20	29	↔ DB1	
KS9		←	21	28	↔ DB2	
RAM1	IC3 Chip select	←	22	27	↔ DB3	
ROM2	IC5 Chip Select	←	23	26	→ RAM2	* NC [KX-R193]
GND	Ground (0 V)		24	25	← E	E Clock

* The pin function of KX-R195 is IC4 Chip Select.

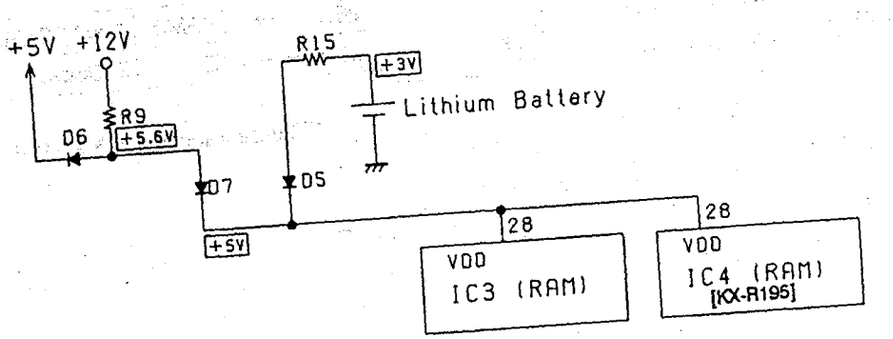
4.3.7 Memory Protection Circuit

The circuit prevents writing data to the RAM chips when the Unit is turned on or off and while the memory retention is in the backup mode. When the reset signal (L level) is provided to IC2 (Gate Array), pin 1 (KS12) of IC2 is turned to high impedance from H level. Thus the RAM CE2 terminal becomes L level by R17, and the RAM data can not be accessed by the CPU thus protecting the memory.
When the reset signal becomes H level from L level, the pin 1 of the Gate Array is turned to H level by the software, and the RAM data can be accessed by the CPU.



4.3.8 Memory Backup Circuit

The circuit contains the lithium battery used to back up the text memory and the margin format. In normal condition, the power is supplied to the RAM from the +12 V power source to maintain the memory. When the voltage at the cathode of D7 becomes lower than +3 V, because of either the power switch or accidental power interruption, the lithium battery starts supplying about +3 V 1 µA to the RAM VDD terminals (IC3) [KX-R193], (IC3, 4) [KX-R195] through R15 and D5 to maintain the memory.



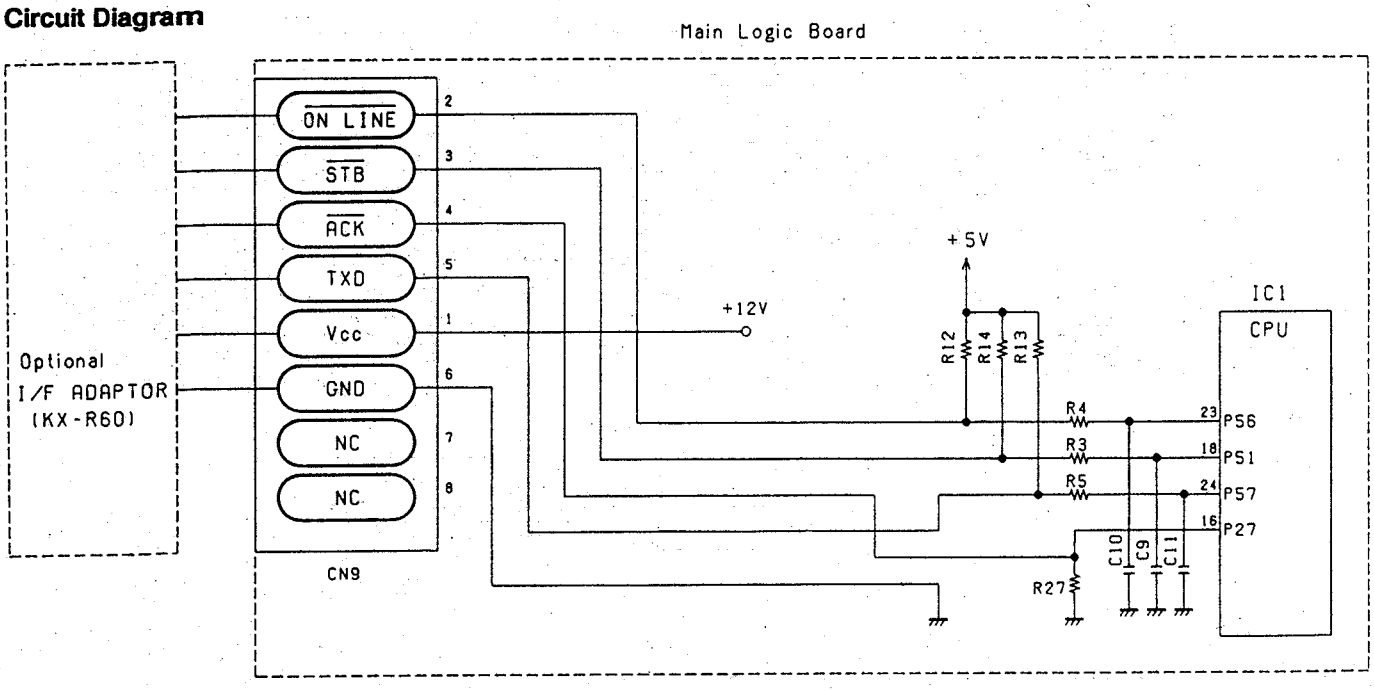
Voltage Condition: At standby condition

4.3.9 Interface Circuit

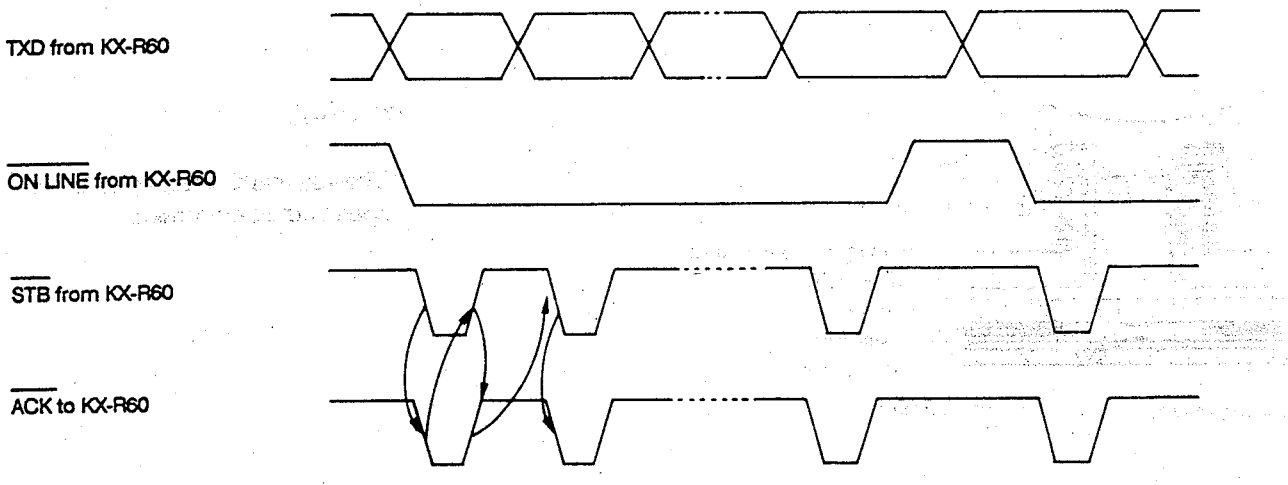
The interface circuit handles the handshaking needed for communication with a I/F adaptor (KX-R60). The KX-R60 allows interfacing with a host computer.
The handshake method is described in the following steps.

Process;
(1) The KX-R60 changes the $\overline{\text{ON LINE}}$ signal from H to L indicating that data transmission has started. This $\overline{\text{ON LINE}}$ signal remains Low during the transmission of 1 byte.
(2) The KX-R60 first sends the LSB (D0) of a transmitted byte to the TXD line and changes the $\overline{\text{STB}}$ signal from H to L. This $\overline{\text{STB}}$ signal is sent to P51 of the CPU which is the interruption.
(3) In the interruption state, the CPU received a TXD signal and changes the $\overline{\text{ACK}}$ signal from H to L. This $\overline{\text{ACK}}$ signal is sent to the KX-R60.
(4) After the KX-R60 has received the $\overline{\text{ACK}}$ signal (L level), the $\overline{\text{STB}}$ signal changes from L to H.
(5) When the $\overline{\text{STB}}$ signal (High) is sent from the KX-R60, the typewriter sends the $\overline{\text{ACK}}$ signal (High) to the KX-R60.
(6) When the $\overline{\text{ACK}}$ signal is High, the KX-R60 starts to send the next bit of data.
(7) Once the KX-R60 sends 1 byte of data (8 bits) to the CPU, the $\overline{\text{ON LINE}}$ signal changes from L to H.

Circuit Diagram

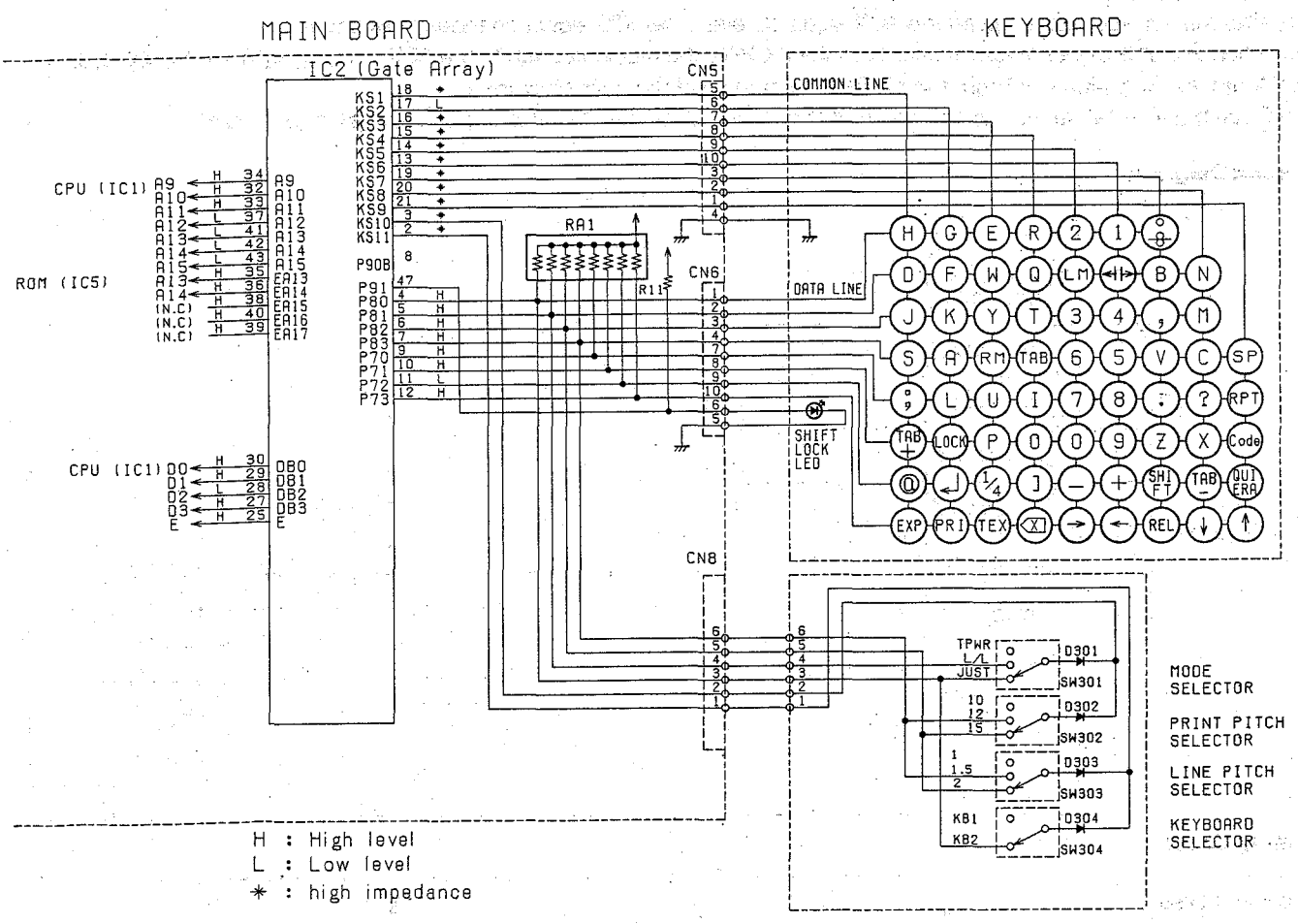


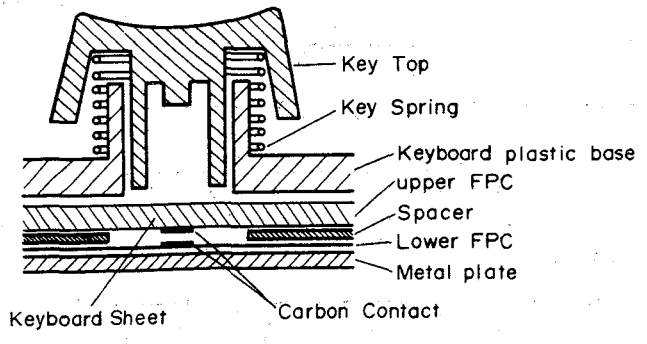
Timing Chart



4.4 Keyboard Matrix Circuit

The matrix circuit is composed of a key scan register, a key scan decoder and an 8 bit expansion input port which are located in the Gate Array (IC2), the keyboard and the function switch board. KS1-KS9 are connected to the keyboard switches and KS9-KS11 are connected to the function switches which are composed of 4 slide switches. When one of the scanning output (KS1-KS11) lines in the scanning decoder is turned from high impedance to Low level, the data of the key which is connected to the selected scanning line, is sent to the CPU through the expansion input port and data bus (D0-D3). The scanning output line (KS1-KS11) which is turned to Low level is determined by data written into the key scan register by the CPU. The CPU then reads the 4 bit key data from P70-P73 (address 0E00) or P80-P83 (address 1000). The CPU can sense all data about every 20 msec. For example, when the CPU reads address 0E00 after writing data "02" to the key scan register and the RETURN key is pushed, the voltages are as shown in the following Schematic.





[KX-R193]

.* The key matrix may be different depending on countries.

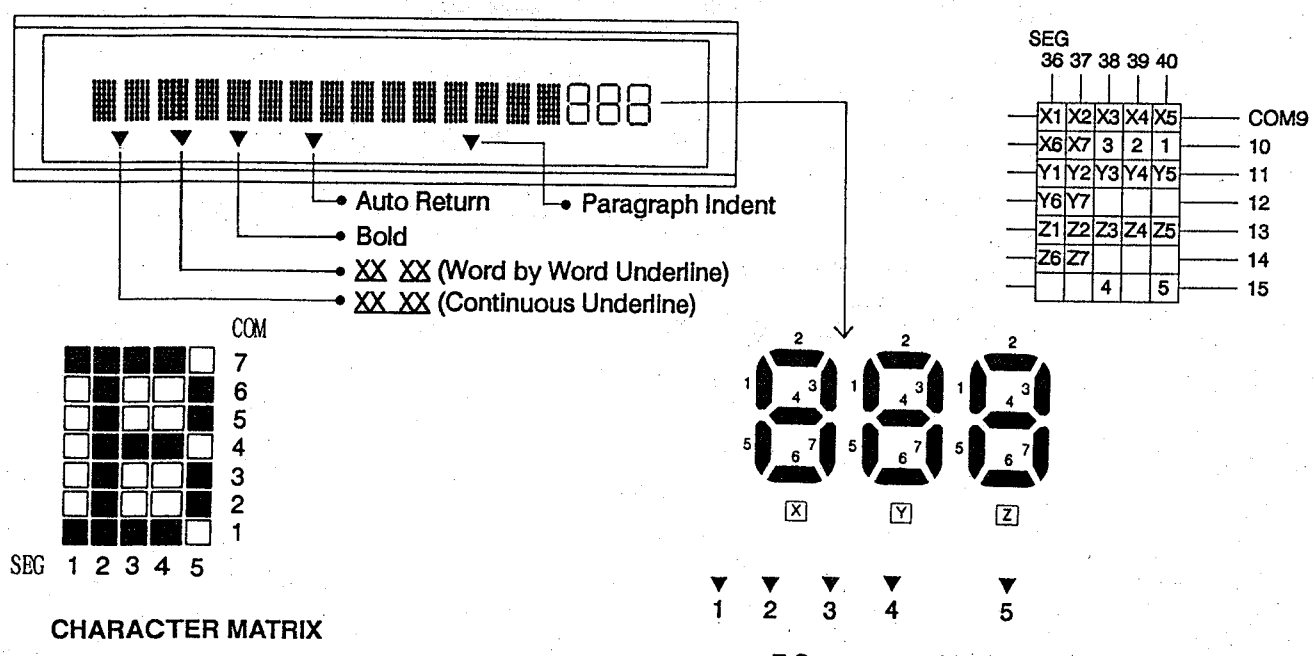
4.5 Liquid Crystal Display

4.5.1 Display

This typewriter utilizes a 14 [KX-R193], a 30 [KX-R195] Character Liquid Crystal Display, consisting of 14 (30) grids of characters, one indicator arrow grid " ◄ ", 3 seven segment displays for the column counter, and 5 mode status indicators. Each grid is a matrix made up of 5 columns and 7 rows, giving each grid 35 points. In addition, 3 seven segment displays are used as a descending character counter of the current typing line.

When the CPU accesses the LCD, the Gate Array (IC2) generates the LCD enable signal (LCDE) synchronized with the E clock pulse from the CPU (IC1).

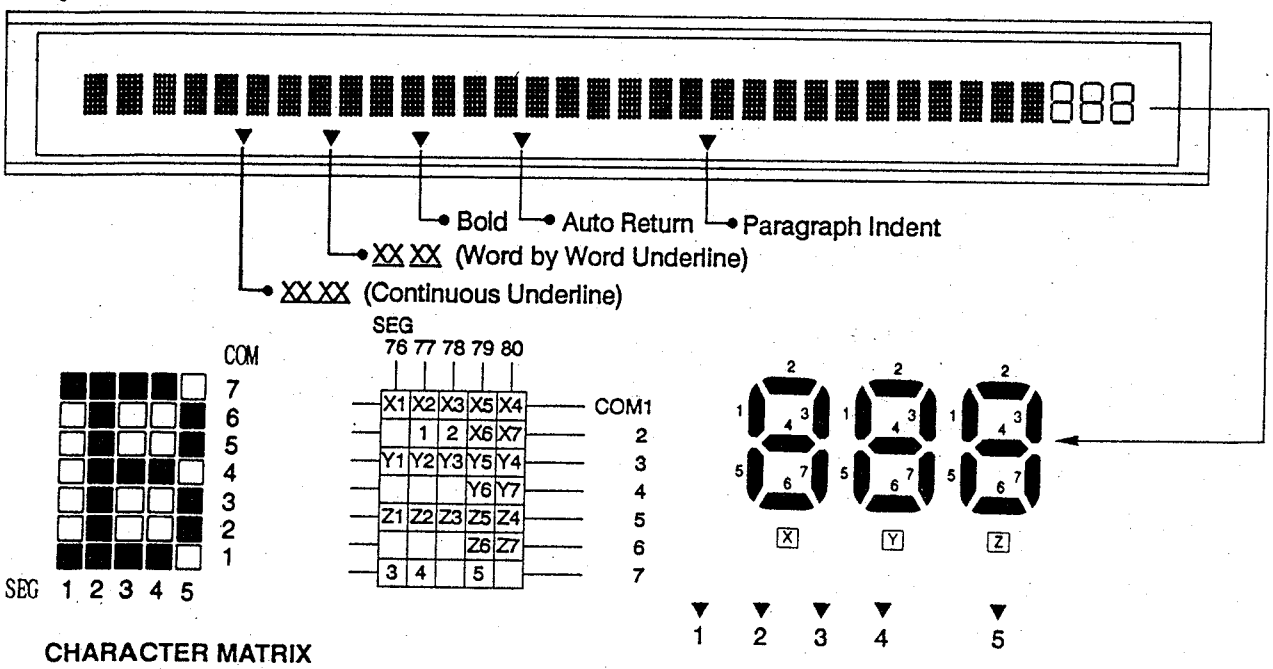
[KX-R193]



CHARACTER MATRIX

7 Segment and Indicator Schematic Diagram

[KX-R195]

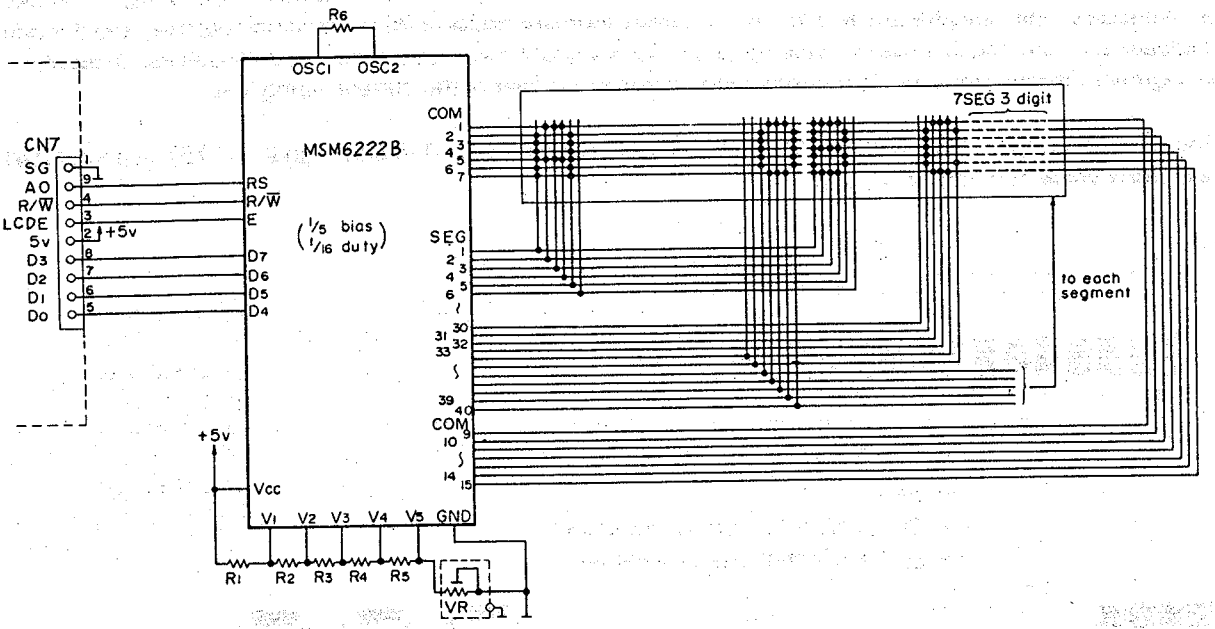


CHARACTER MATRIX

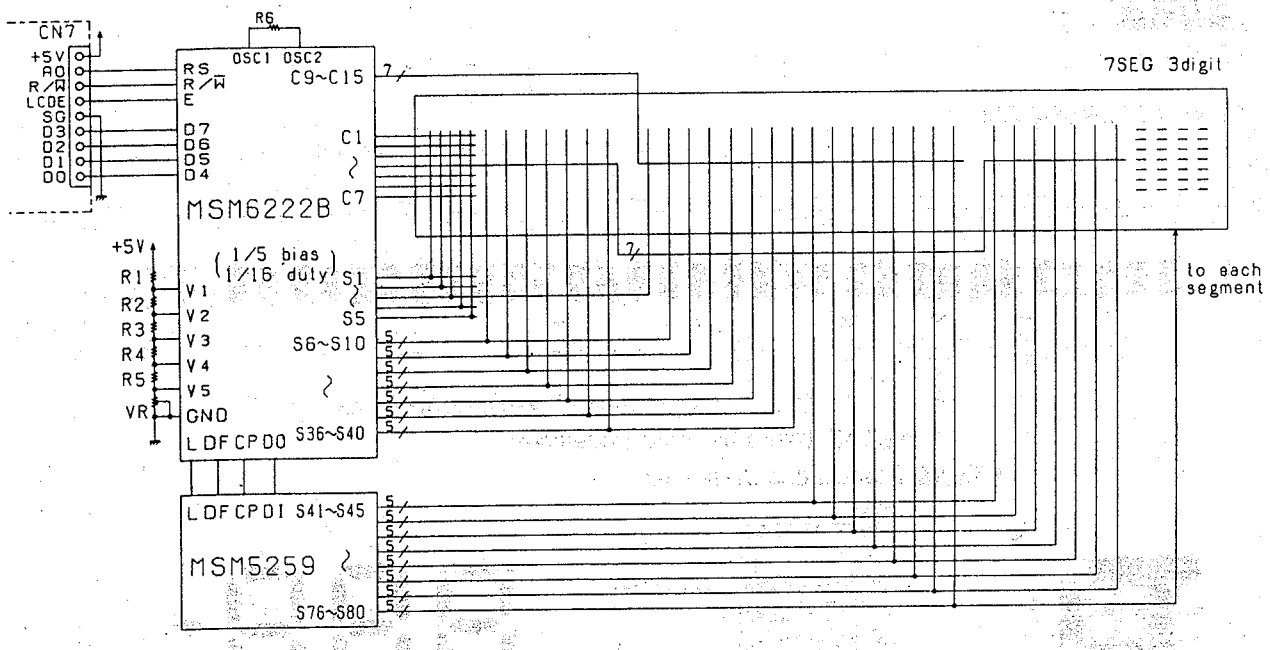
7 Segment and Indicator Schematic Diagram

4.5.2 Display Schematic Diagram

[KX-R193]



[KX-R195]



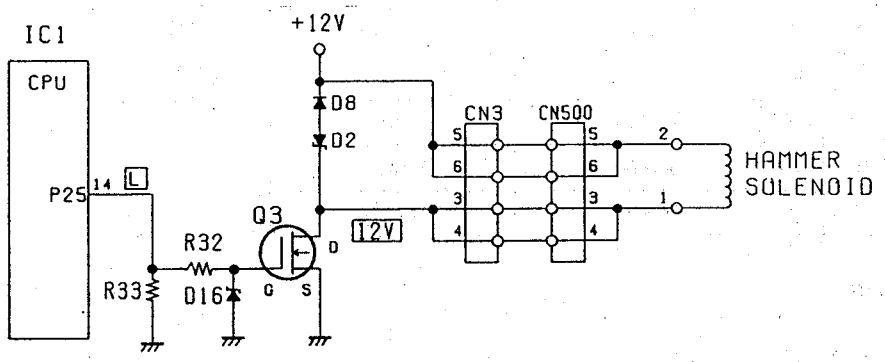
4.6 Drive Circuit

4.6.1 Print Hammer Drive Circuit

When energized the plunger of the hammer solenoid strikes the print hammer, which in turn impacts a spoke on the daisywheel and prints a character. The amount of impact force is controlled by the software.
Each character on the Daisywheel has a different surface area, requiring a different impact for proper print. For example, a capital "W" has a large surface area, requiring a heavier impact to print correctly. A period ".", however, requires much less impact to obtain the same impression. When a "W" is typed it is given a longer impact time than a ".". In this way each character has its own defined impact duration, providing an even impression level.
This typewriter has three impression levels. "IMPRESSION:1" is softer than "IMPRESSION:3". The impression level that is set, is retained when the typewriter is turned off.

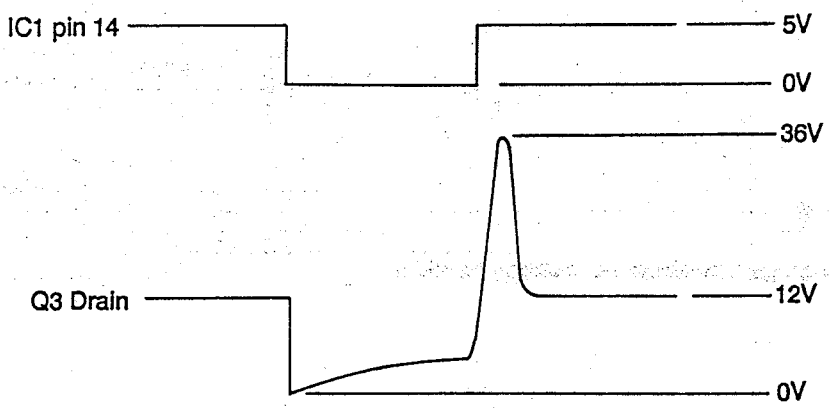
The print hammer drive circuit mainly consists of Q3, D2 and D8. The CPU (IC1) generates a signal for a specific amount of time. When the P25 of IC1 is turned to H level from L level, Q3 is turned on, activating the hammer solenoid. The current through the hammer solenoid is fixed at about 4 amps.

Schematic Diagram



Voltage Condition: At standby condition

Timing Chart



4.6.2 DC Motor Drive and Sensor Circuit

Paper feed and ribbon feed motors are +12 V bi-directional DC motors, controlled by IC9, which is able to drive two motors at different times. The driving motor (paper feed or ribbon feed) is selected by the signal received from Port 65 and 66 of CPU (IC1) and the direction of motor rotation (index or reverse index) is dependent on the signal received from Port 67 of IC1, as indicated in the truth table.

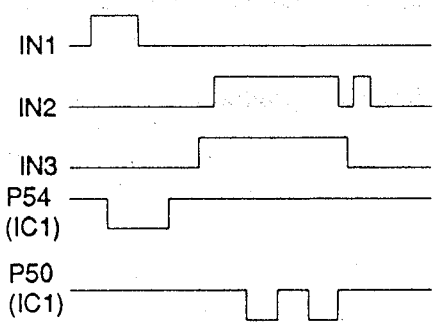
SW501 (ribbon feed sensor) is used to monitor the position of the drive cam by detecting the position of a magnet mounted on the Gear.

SW502 (paper feed sensor/carrier home sensor) is used to monitor the position of the intermediate gear by a cam mounted on the gear. And also SW502 is used to detect the carrier home position, when the power switch is turned on.

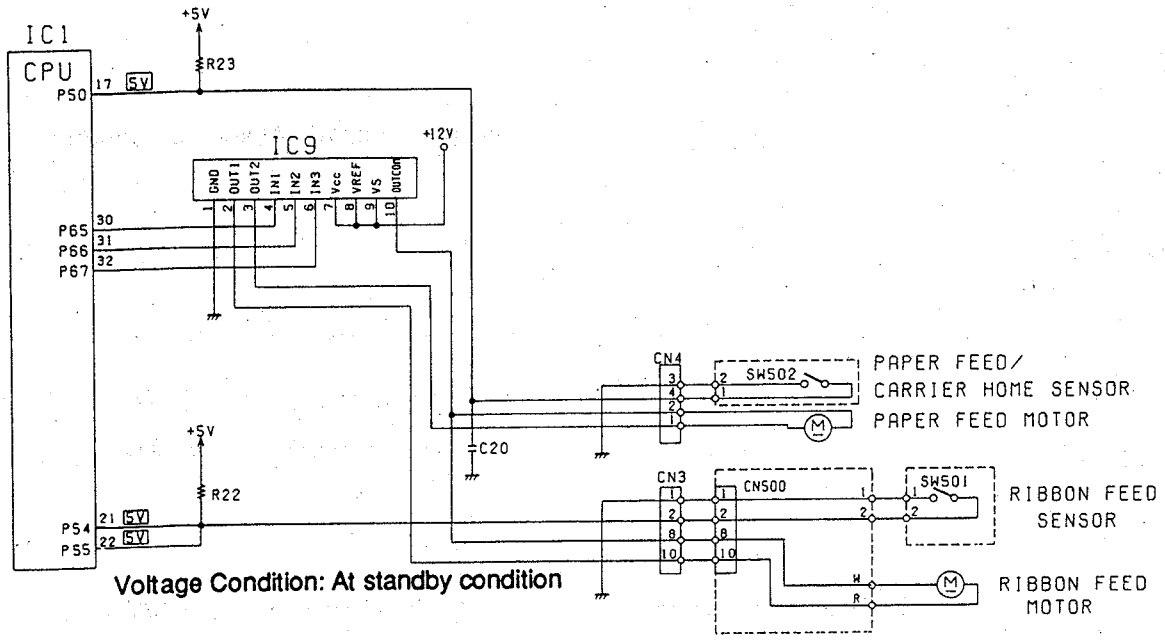
Truth Table

Input			Output			Function	
IN1	IN2	IN3	OUT1	OUT COM	OUT2	Ribbon Feed Motor Output OUT1, OUT COM	Paper Feed Motor Output OUT2, OUT COM
0	0	0	0	0	0	Braking	Braking
0	0	1	0	0	0	Braking	Braking
0	1	0	OFF	1	0	Open	↻ CW
0	1	1	OFF	0	1	Open	↺ CCW
1	0	0	0	1	OFF	↻ CW	Open
1	0	1	1	0	OFF	↺ CCW	Open
1	1	0	0	0	0	Braking	Braking
1	1	1	0	0	0	Braking	Braking

Timing Chart



Schematic Diagram



Voltage Condition: At standby condition

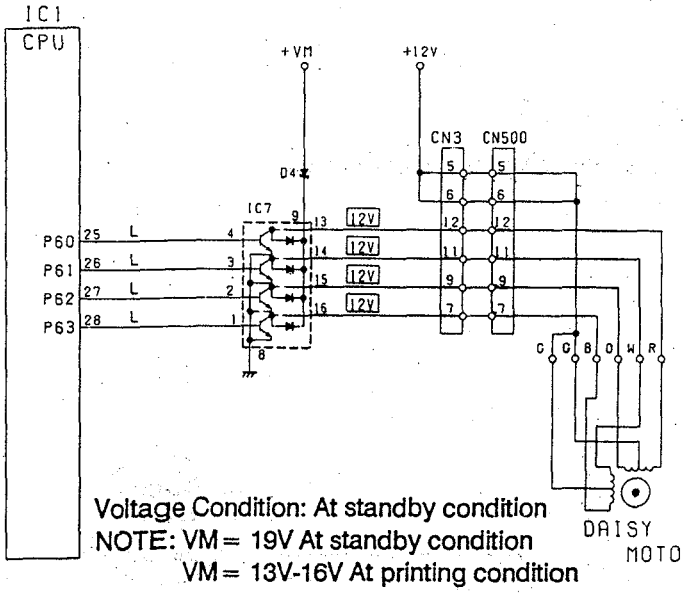
4.6.3 Daisywheel Motor and Carrier Spacing Motor Drive Circuit

The daisywheel motor and the carrier spacing motor are four-phase uni-polar PM type stepping motors. The stepping signal of the carrier spacing motor originates at P20, P21, P22 and P23 of IC1. The stepping signal of the daisywheel motor originates at P60, P61, P62 and P63 of IC1. These signals are sent to the transistor array IC8 and IC7.

A step/hold control line, supplied by P24 of IC1 controls the amount of current supplied to the motor while it is stepping or holding. When P24 of IC1 is Low, +VM is supplied through R25, R30 and R31 giving the motor less current while it is holding. When P24 of IC1 is High, +VM is supplied through Q2 ,R30 and R31 giving the motor extra current needed for stepping.

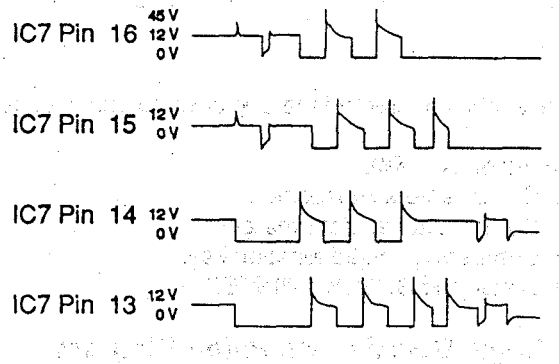
The daisywheel motor drive circuit does not have a voltage control circuit.

Daisywheel Motor Drive Circuit

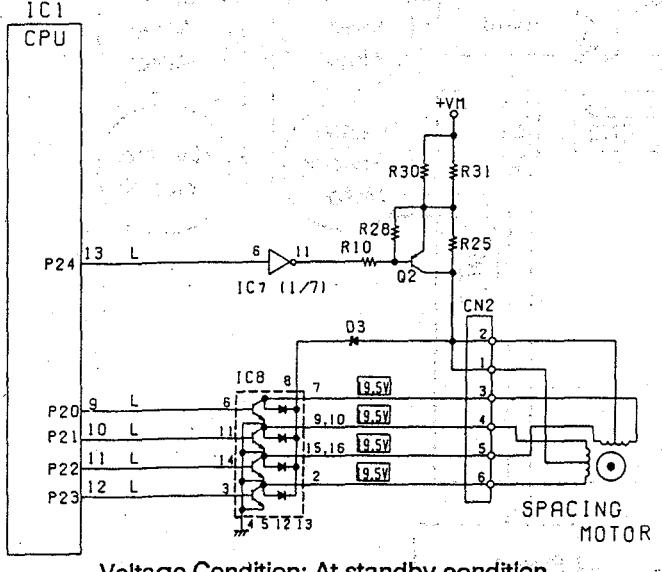


Voltage Condition: At standby condition
NOTE: VM = 19V At standby condition
VM = 13V-16V At printing condition

Timing Chart

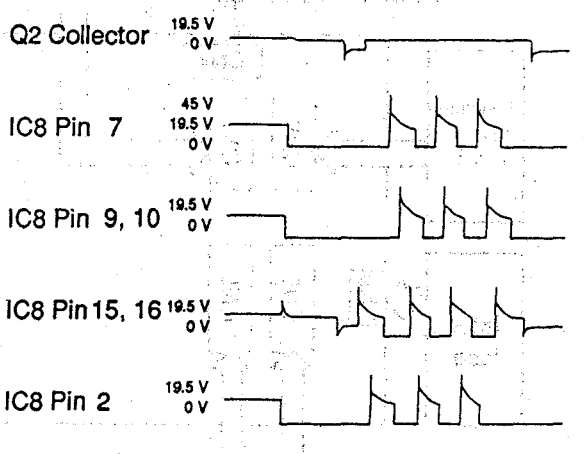


Carrier Spacing Motor Drive Circuit



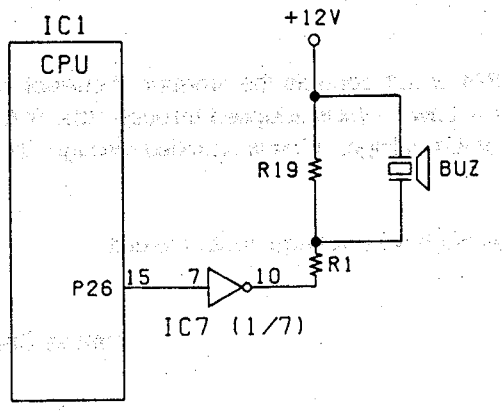
Voltage Condition: At standby condition
NOTE: VM = 19V At standby condition
VM = 13V-16V At printing condition

Timing Chart



4.6.4 Buzzer Circuit

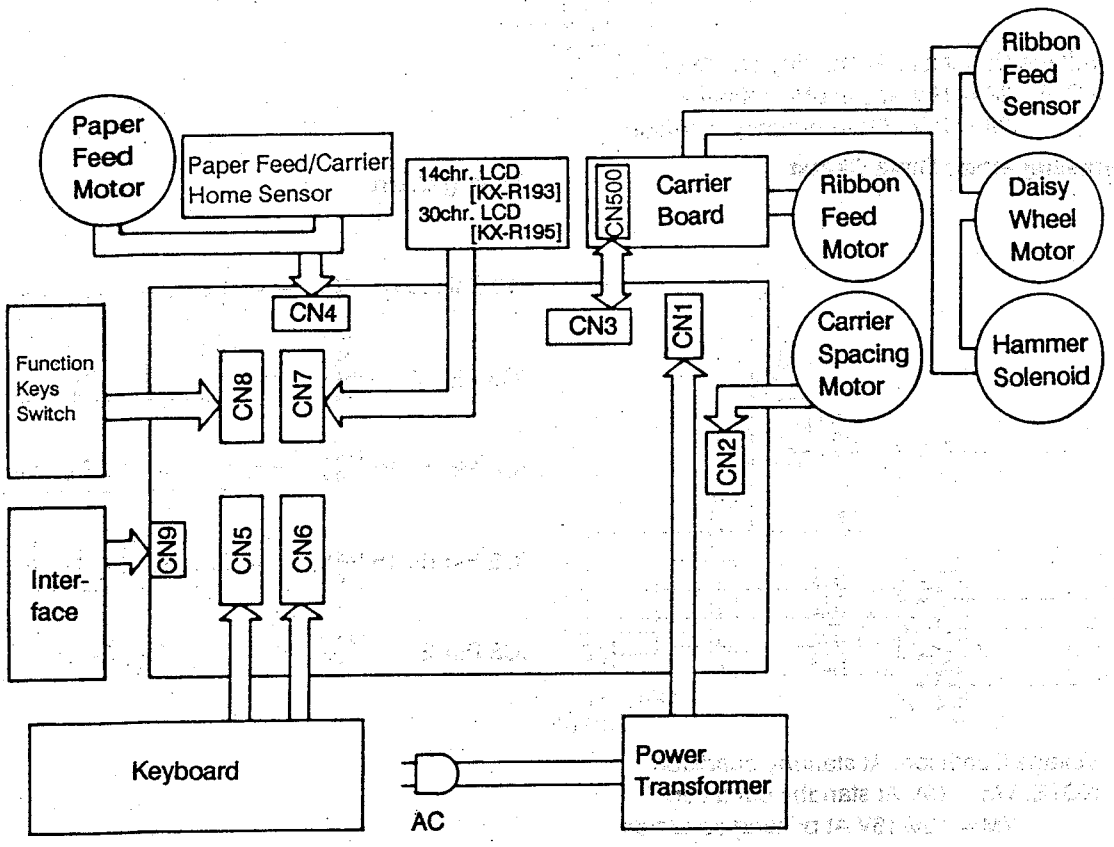
The Buzzer receives a signal (about 2.3 kHz) from Port 26 (Pin 15) of IC1 which turns on or off IC7 (IN Pin 7, OUT Pin 10), driving the buzzer.



The Buzzer is mounted on the Logic Board and sounds under the following circumstances:

1) Sound of "A"
   a) Carrier enters Hot-Zone.
   b) Carrier reaches right margin.
   c) Depressing invalid function key.
   d) Displaying CHECK PRINTER.

4.7 Logic Board Connection Diagram



4.8 Explanation of Connectors

CN1 Power Transformer Connector

Pin No.	Signal Name	Color of Lead	
1	AC16 V	Red	For Electric Circuit
2	AC16 V	Red	For Electric Circuit

CN2 Carrier Spacing Motor Connector

Pin No.	Signal Name	Description of Signal	Direction
1	SCR	Carrier Spacing Motor Power Supply	Out
2	SCR		
3	CRA	Phase A for Carrier Spacing Motor Drive	Out
4	CRB	Phase B for Carrier Spacing Motor Drive	Out
5	$\overline{\text{CRA}}$	Phase $\overline{\text{A}}$ for Carrier Spacing Motor Drive	Out
6	$\overline{\text{CRB}}$	Phase $\overline{\text{B}}$ for Carrier Spacing Motor Drive	Out

CN3 Carrier Connector

Pin No.	Signal Name	Description of Signal	Direction
1	GND	Ground	—
2	RBS	Ribbon Sensor	In
3	HSE	Hammer Solenoid Enable	Out
4	HSE		
5	+12 V	+12 V	Out
6	+12 V		
7	DSA	Phase A for Daisywheel Motor Drive	Out
8	RBP	Phase (+) of Ribbon Feed Motor	Out
9	DSB	Phase B for Daisywheel Motor Drive	Out
10	RBN	Phase (–) of Ribbon Feed Motor	Out
11	$\overline{\text{DSA}}$	Phase $\overline{\text{A}}$ for Daisywheel Motor Drive	Out
12	$\overline{\text{DSB}}$	Phase $\overline{\text{B}}$ for Daisywheel Motor Drive	Out

CN4 Sensor Connector

Pin No.	Signal Name	Description of Signal	Direction
1	LFN	Phase (–) of Paper Feed Motor	Out
2	LFP	Phase (+) of Paper Feed Motor	Out
3	GND	Ground	—
4	LFS	LF/Carrier Sensor	In

CN5 Keyboard Connector 1

Pin No.	Signal Name	Description of Signal	Direction
1	KS9	Key Strobe	Out
2	KS8		
3	KS7		
4	GND	Ground	—
5	KS1	Key Strobe	Out
6	KS2		
7	KS3		
8	KS4		
9	KS5		
10	KS6		

CN6 Keyboard Connector 2

Pin No.	Signal Name	Description of Signal	Direction
1	P80	Key Data	In
2	P81		
3	P82		
4	P83		
5	GND	Ground	—
6	LED	Shift Lock LED	Out
7	P70	Key Data	In
8	P71		
9	P72		
10	P73		

CN7 14ch. LCD Connector [KX-R193]
30ch. LCD Connector [KX-R195]

Pin No.	Signal Name	Description of Signal	Direction
1	GND	Ground	—
2	+5 V	+5 V	Out
3	LCDE	Enable	Out
4	R/$\overline{W}$	Read/$\overline{Write}$	Out
5	D0	Data Bus	In/Out
6	D1		
7	D2		
8	D3		
9	A0	Address Bus	Out

CN8 Control Panel Connector

Pin No.	Signal Name	Description of Signal	Direction
1	KS11	Key Strobe	Out
2	KS10		
3	P80	Key Data	In
4	P81		
5	P82		
6	P83		

CN9 Interface Connector

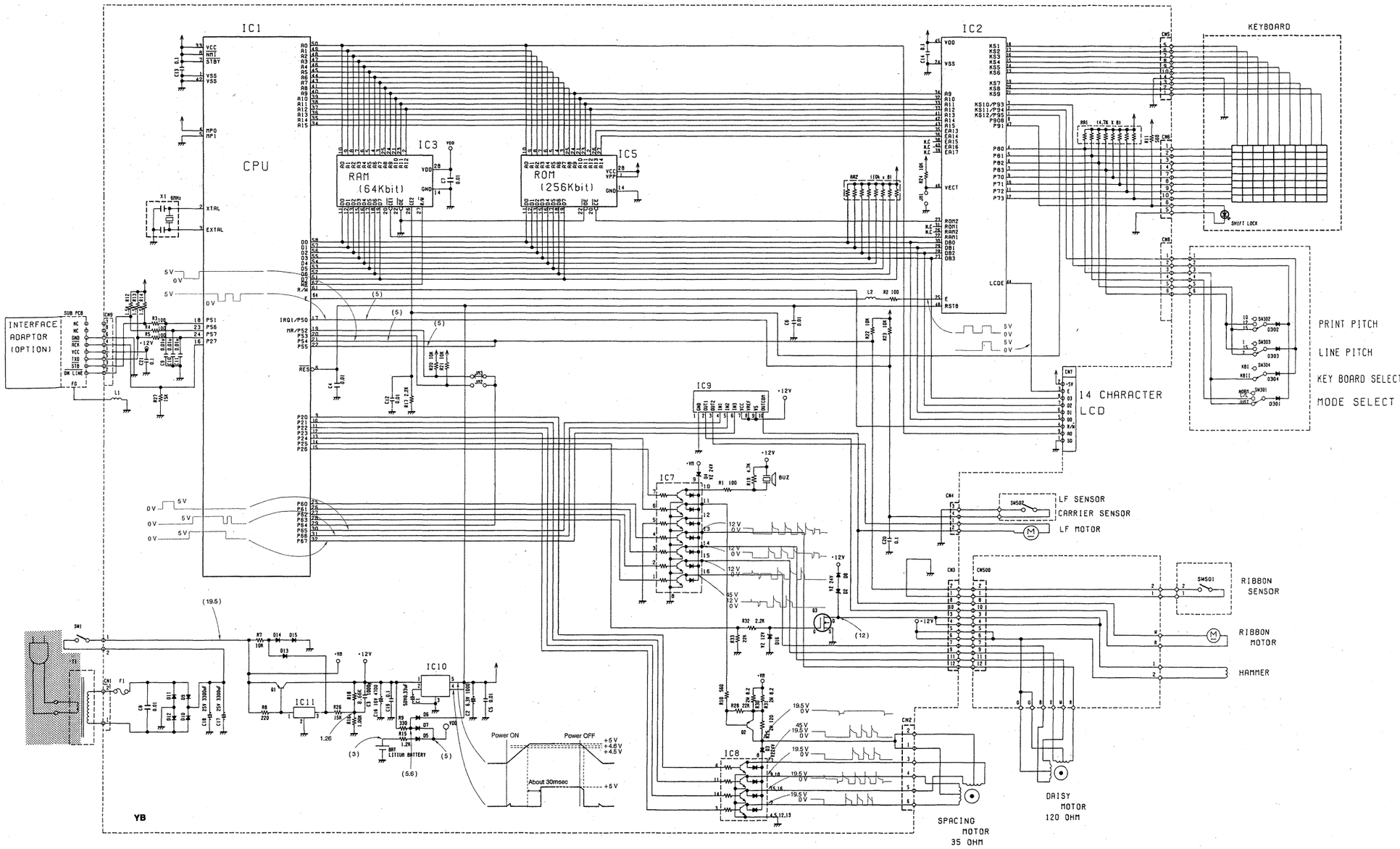
Pin No.	Signal Name	Description of Signal	Direction
1	VCC	+12 V	—
2	$\overline{ONL}$	ON LINE	In
3	$\overline{STB}$	Strobe from computer	In
4	$\overline{ACK}$	Acknowledge	Out
5	TXD	Transmitted DATA	In
6	GND	Ground	—
7	NC	Not connected	—
8	NC	Not connected	—

CN500 Carrier Connector

Pin No.	Signal Name	Description of Signal	Direction
1	GND	Ground	—
2	RBS	Ribbon Sensor	In
3	HSE	Hammer Solenoid Enable	Out
4	HSE		
5	+12 V	+12 V	Out
6	+12 V		
7	DSA	Phase A for Daisywheel Motor Drive	Out
8	RBP	Phase (+) of Ribbon Feed Motor	Out
9	DSB	Phase B for Daisywheel Motor Drive	Out
10	RBN	Phase (–) of Ribbon Feed Motor	Out
11	$\overline{DSA}$	Phase $\overline{A}$ for Daisywheel Motor Drive	Out
12	$\overline{DSB}$	Phase $\overline{B}$ for Daisywheel Motor Drive	Out

4.9 Logic Board Schematics

4.9.1 Logic Board KX-R193



Note: The voltage are measured in "Self Print" mode.
( ): Standby condition

NOTE
VM: +19 V AT STAND-BY CONDITION
+13 V-+16 V AT PRINTING CONDITION

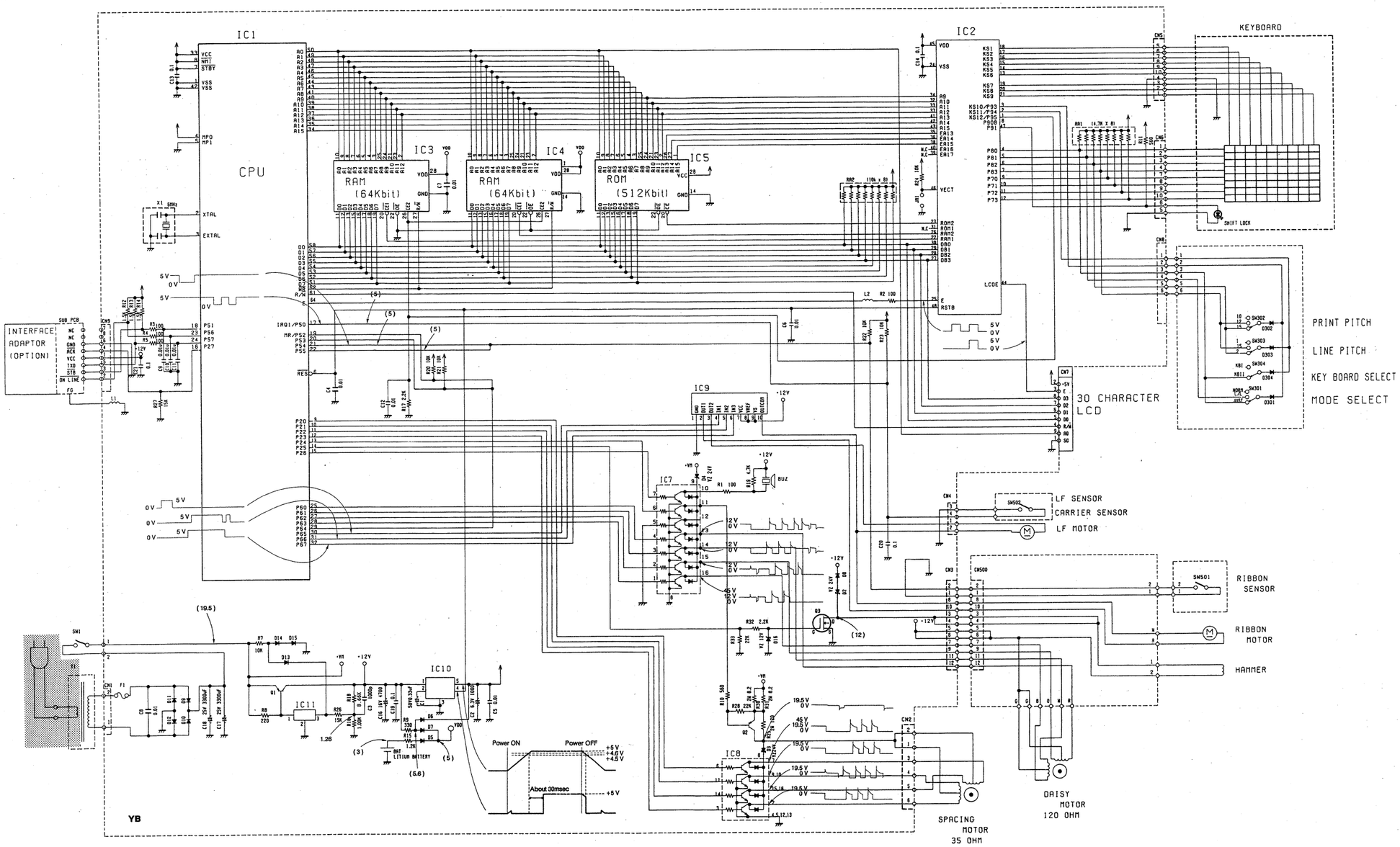
VDD: +5 V AT POWER ON CONDITION
+3 V AT POWER OFF CONDITION

: +5 V

Important safety notice:

The shaded area on this schematic diagram incorporates special features important for protection from fire and electrical shock hazards. When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

4.9.2 Logic Board KX-R195



Note: The voltage are measured in "Self Print" mode.
( ): Standby condition

NOTE

VM: +19 V AT STAND-BY CONDITION
+13 V-+16 V AT PRINTING CONDITION

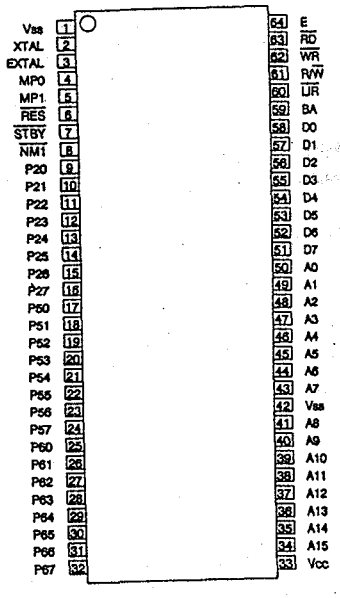
VDD: +5 V AT POWER ON CONDITION
+3 V AT POWER OFF CONDITION

: +5 V

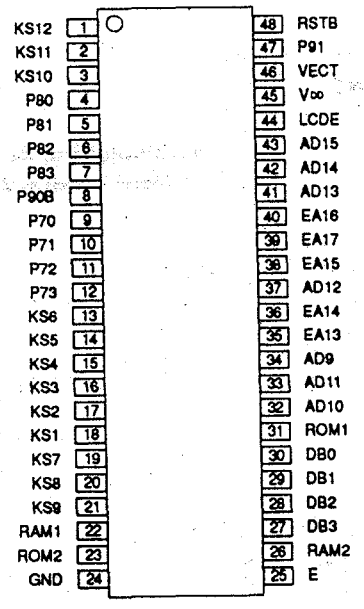
Important safety notice:

The shaded area on this schematic diagram incorporates special features important for protection from fire and electrical shock hazards. When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

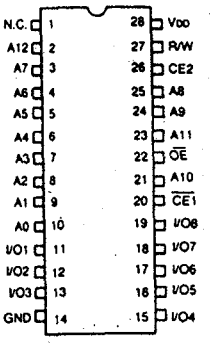
4.10 Component Reference Guide



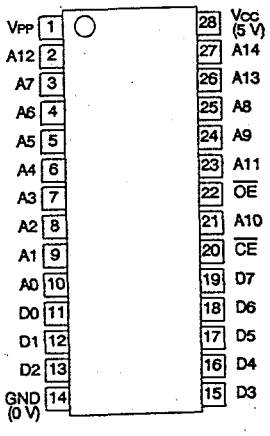
HD63B03X
(IC1)



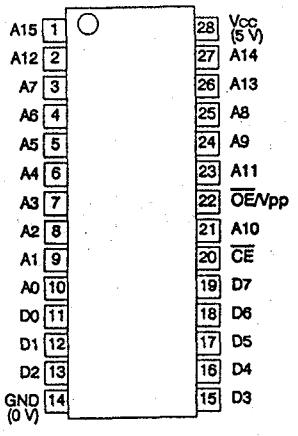
M7032H
(IC2)



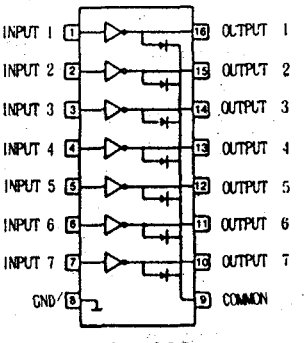
M5165LL
(IC3) [KX-R193]
(IC3, 4) [KX-R195]



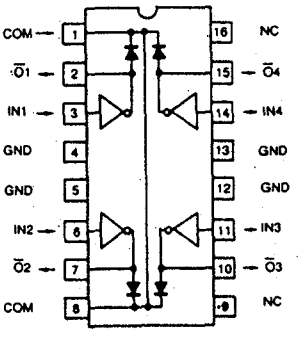
R193U [KX-R193]
(IC5)



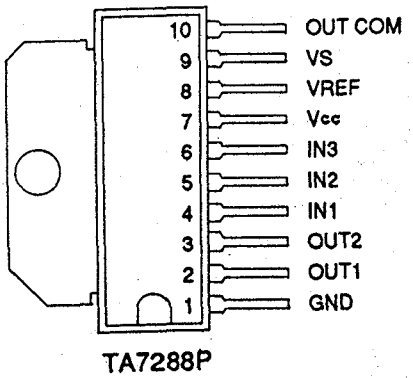
R195U [[KX-R195]
(IC5)



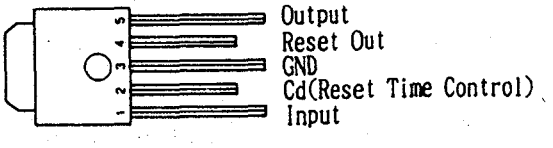
BA12003
(IC7)



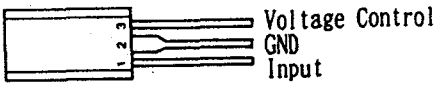
M54532P
(IC8)



TA7288P
(IC9)

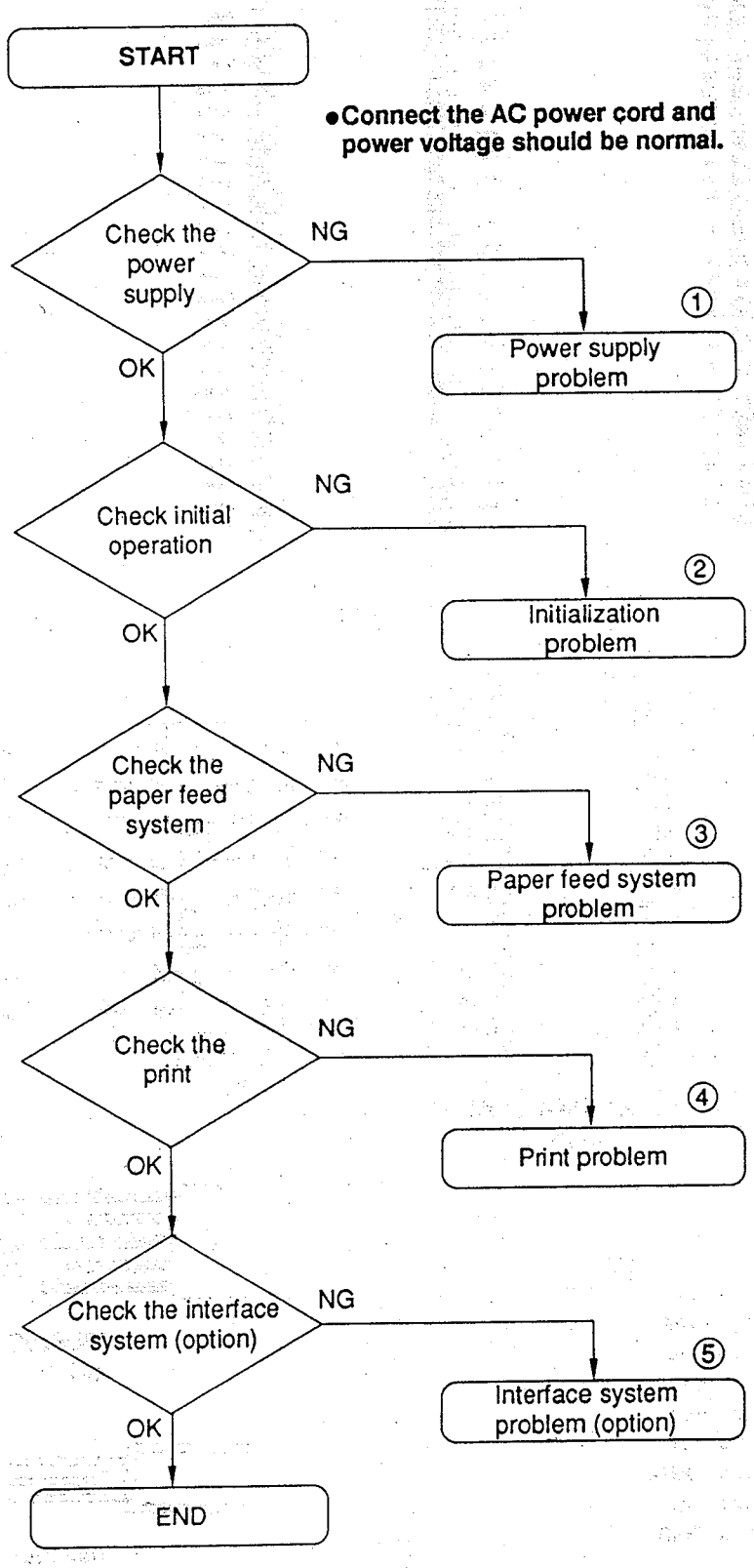


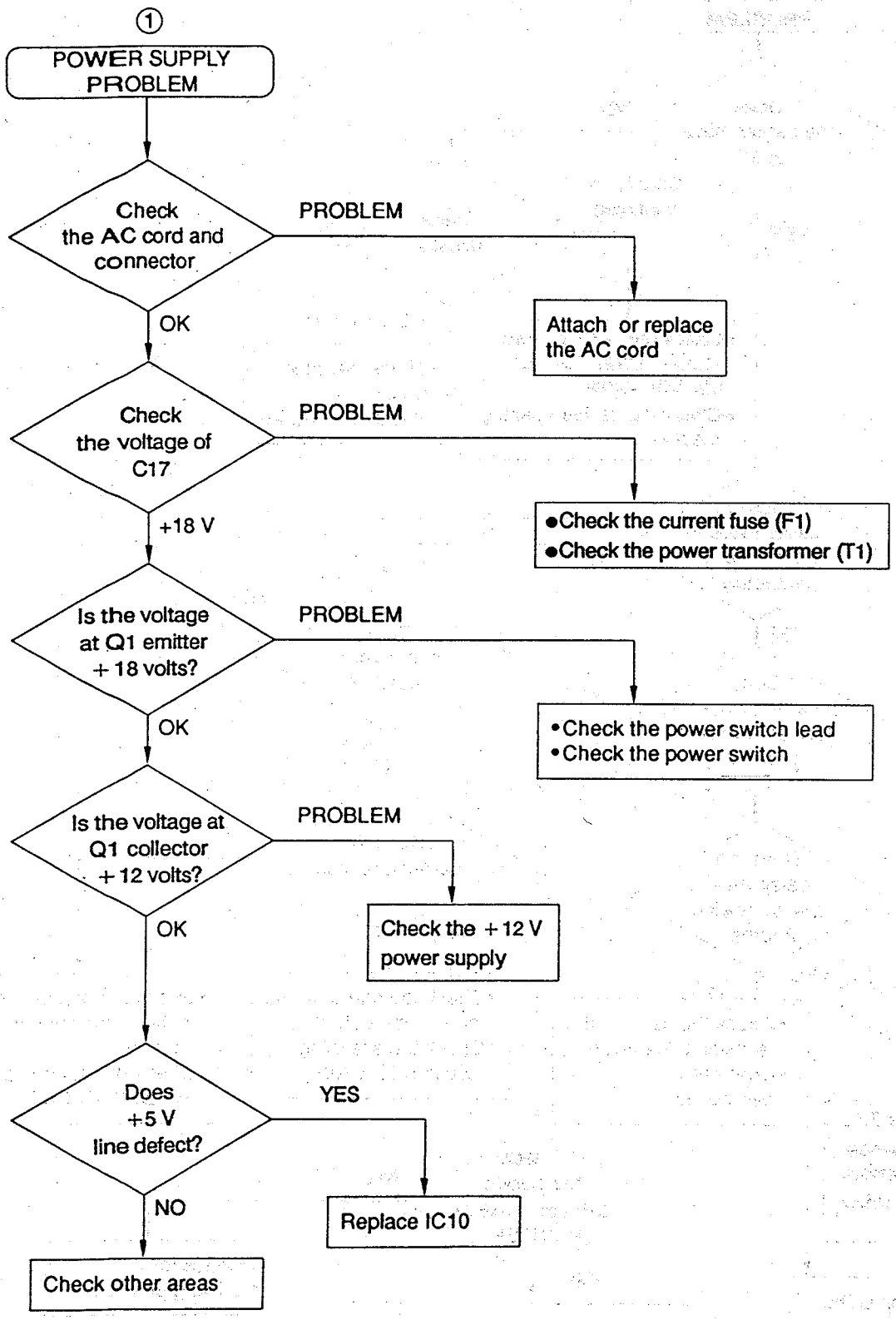
L78LR05C
(IC10)

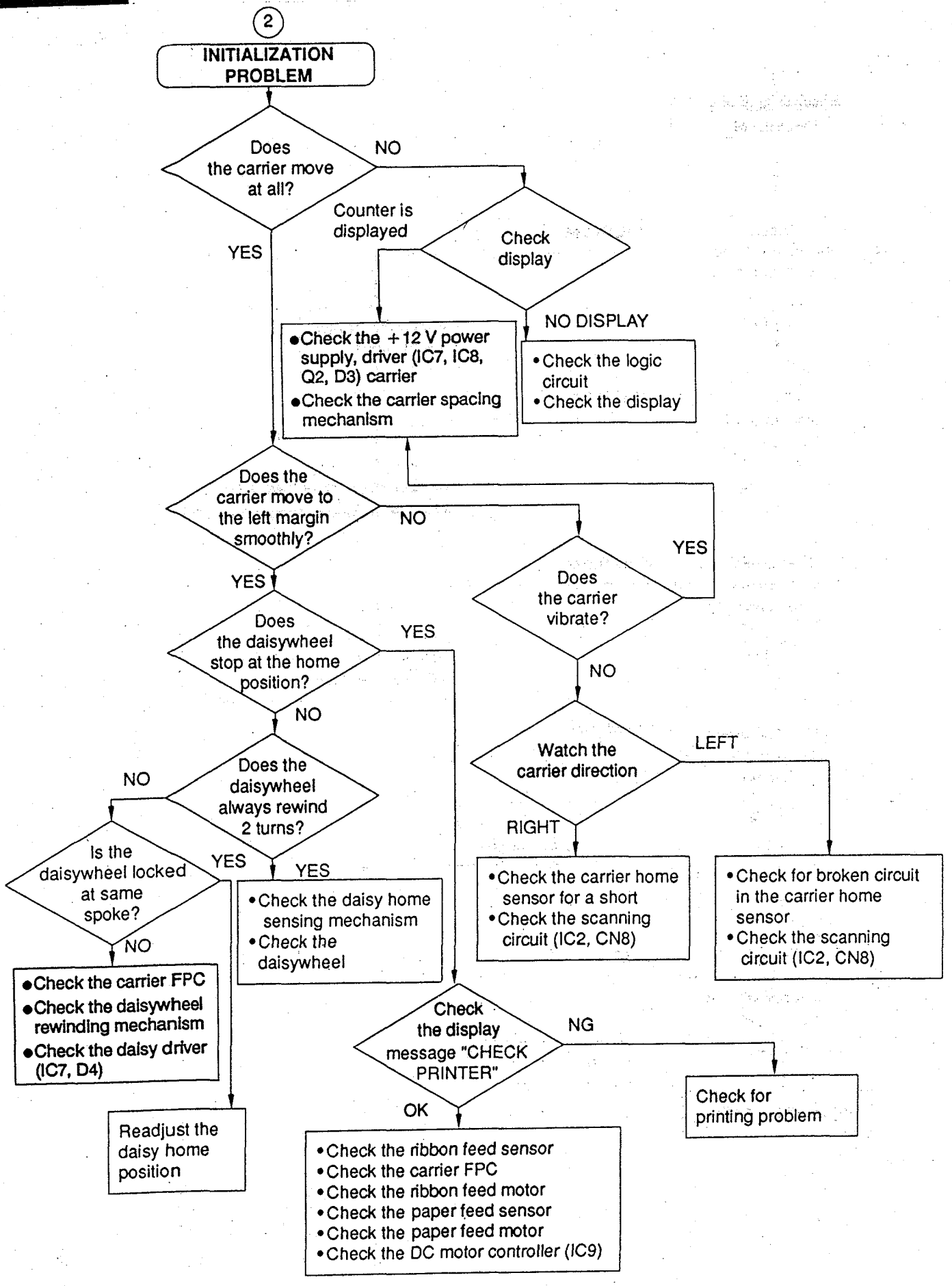


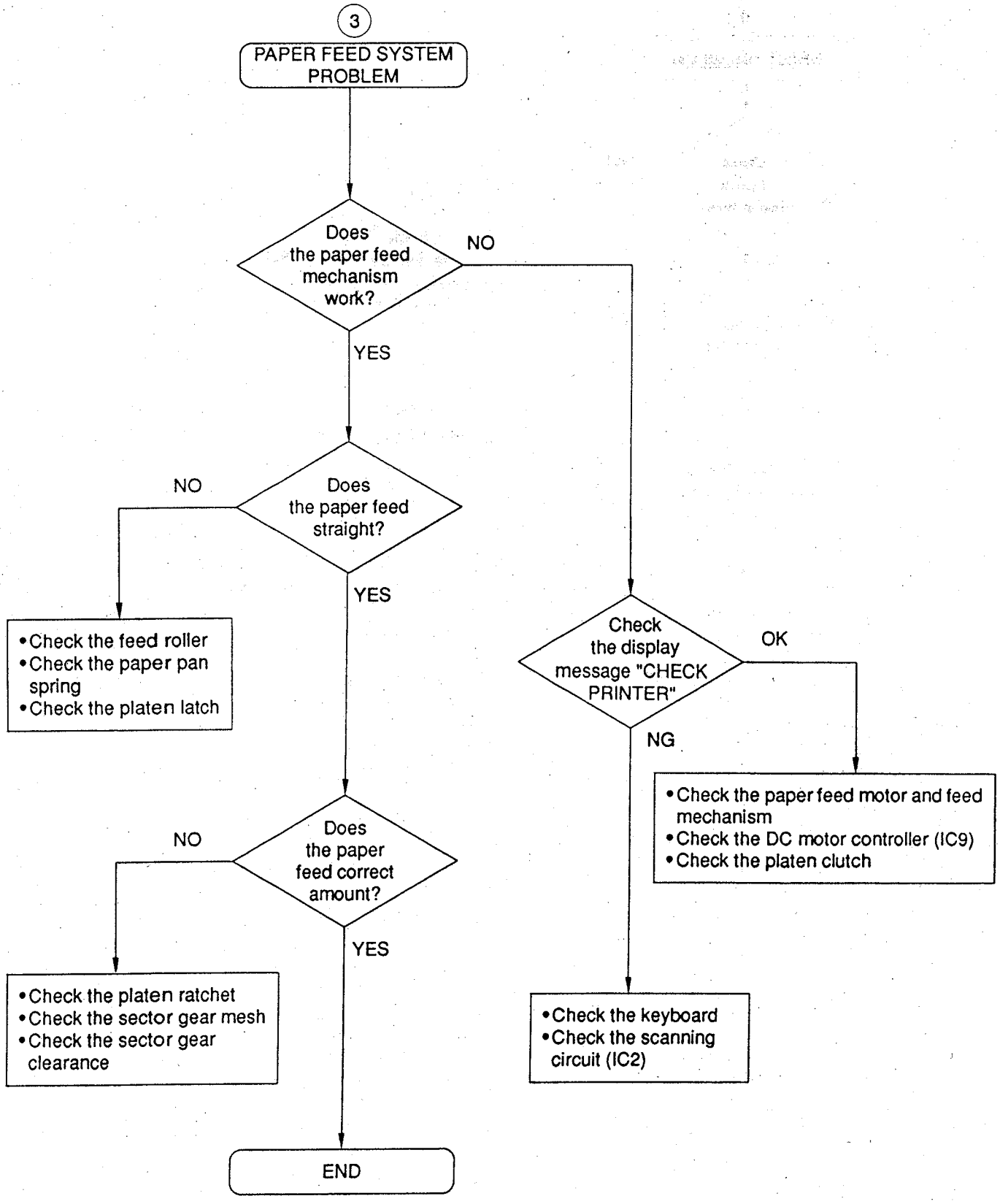
M5236L
(IC11)

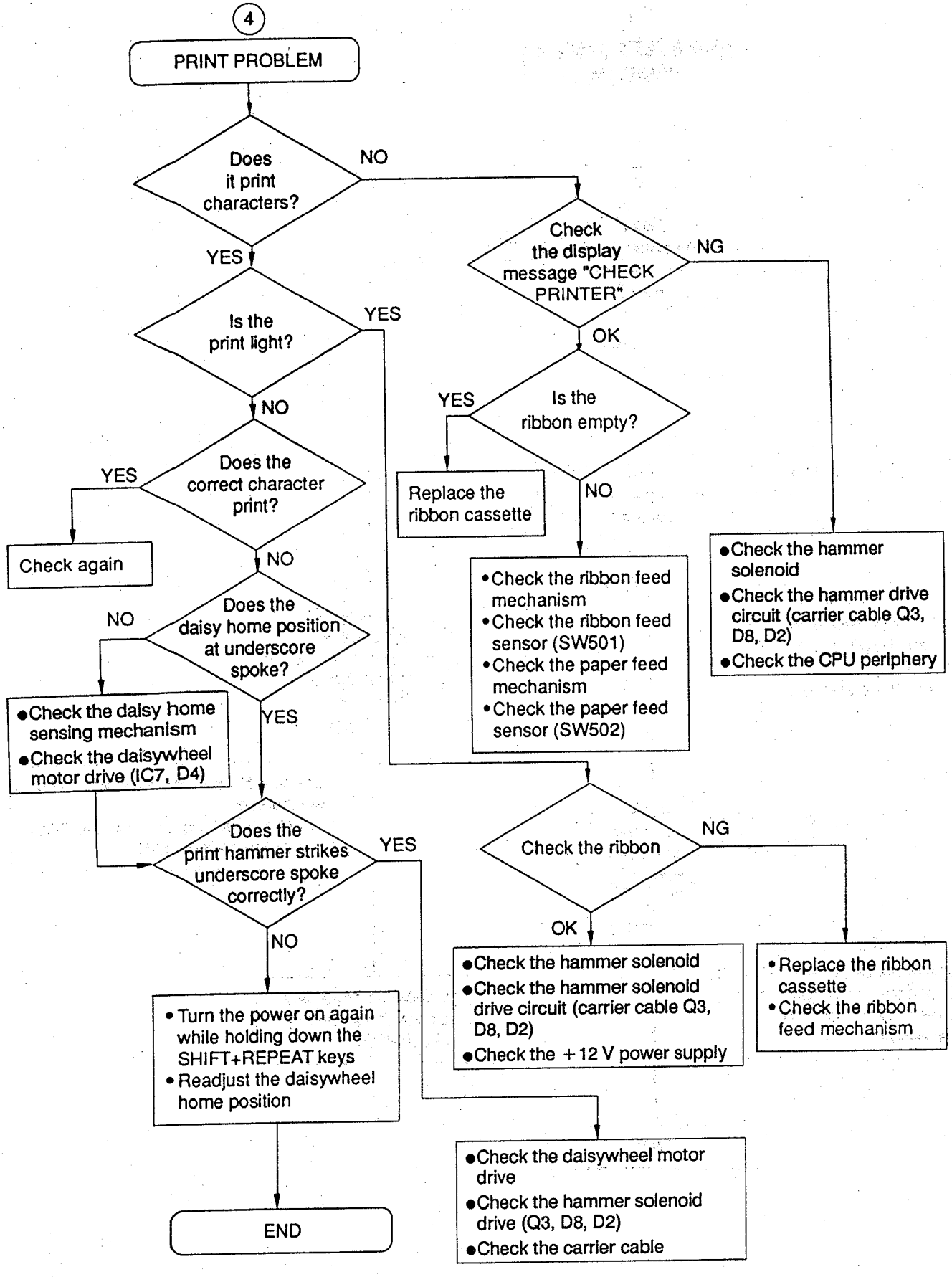
4.11 Flow Chart

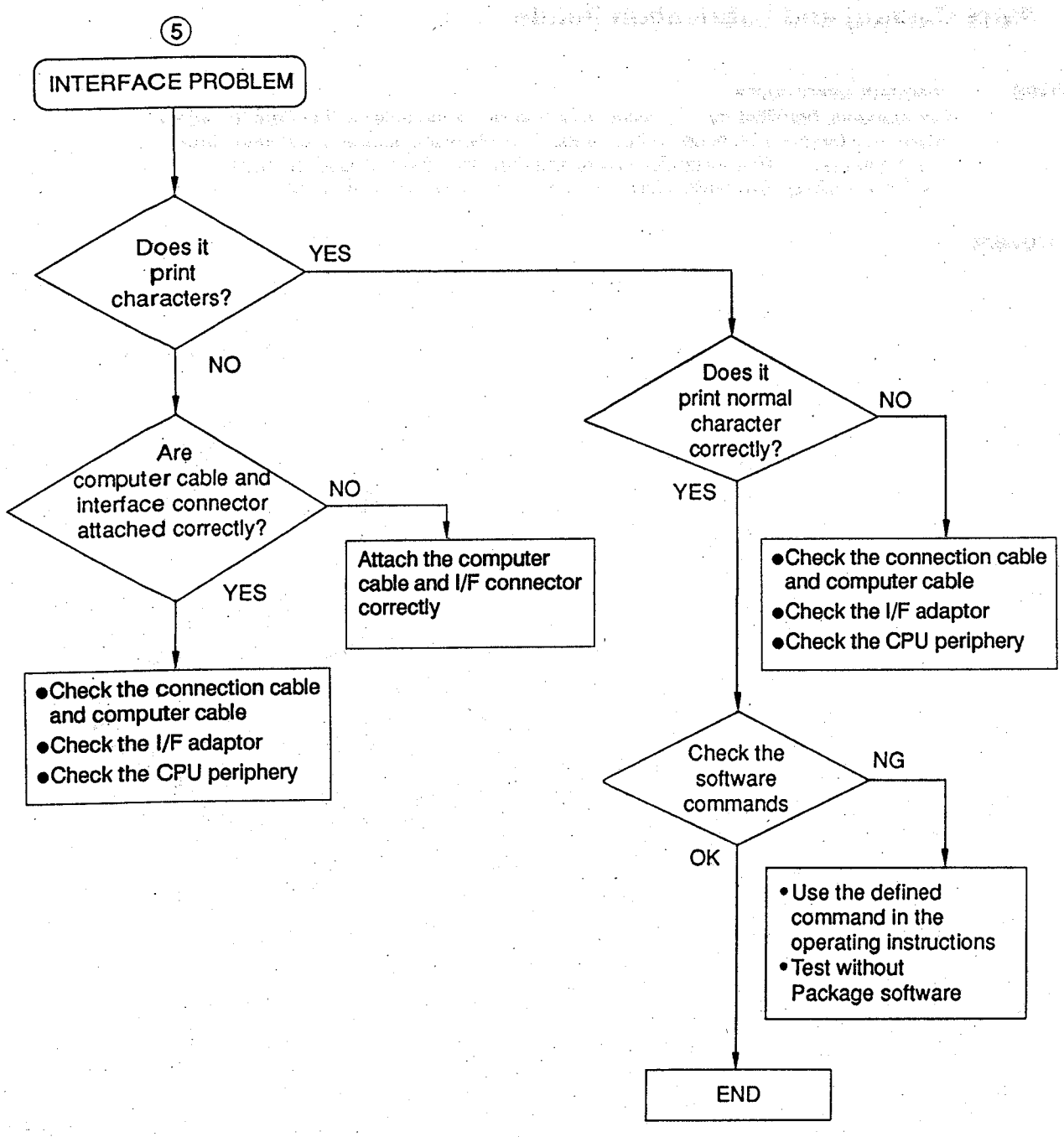



①
POWER SUPPLY PROBLEM
Check the AC cord and connector
PROBLEM
Attach or replace the AC cord
OK
Check the voltage of C17
PROBLEM
•Check the current fuse (F1)
•Check the power transformer (T1)
+18 V
Is the voltage at Q1 emitter + 18 volts?
PROBLEM
•Check the power switch lead
•Check the power switch
OK
Is the voltage at Q1 collector + 12 volts?
PROBLEM
Check the + 12 V power supply
OK
Does +5 V line defect?
YES
Replace IC10
NO
Check other areas


2
INITIALIZATION PROBLEM
Does the carrier move at all?
NO
YES
Counter is displayed
Check display
NO DISPLAY
•Check the +12 V power supply, driver (IC7, IC8, Q2, D3) carrier
•Check the carrier spacing mechanism
•Check the logic circuit
•Check the display
Does the carrier move to the left margin smoothly?
NO
YES
YES
Does the carrier vibrate?
YES
NO
Does the daisywheel stop at the home position?
YES
NO
Watch the carrier direction
LEFT
RIGHT
Does the daisywheel always rewind 2 turns?
NO
YES
Is the daisywheel locked at same spoke?
YES
NO
•Check the daisy home sensing mechanism
•Check the daisywheel
•Check the carrier home sensor for a short
•Check the scanning circuit (IC2, CN8)
•Check for broken circuit in the carrier home sensor
•Check the scanning circuit (IC2, CN8)
•Check the carrier FPC
•Check the daisywheel rewinding mechanism
•Check the daisy driver (IC7, D4)
Readjust the daisy home position
Check the display message "CHECK PRINTER"
NG
OK
Check for printing problem
•Check the ribbon feed sensor
•Check the carrier FPC
•Check the ribbon feed motor
•Check the paper feed sensor
•Check the paper feed motor
•Check the DC motor controller (IC9)


3
PAPER FEED SYSTEM PROBLEM
Does the paper feed mechanism work?
NO
YES
Does the paper feed straight?
NO
YES
•Check the feed roller
•Check the paper pan spring
•Check the platen latch
Does the paper feed correct amount?
NO
YES
•Check the platen ratchet
•Check the sector gear mesh
•Check the sector gear clearance
END
Check the display message "CHECK PRINTER"
OK
NG
•Check the paper feed motor and feed mechanism
•Check the DC motor controller (IC9)
•Check the platen clutch
•Check the keyboard
•Check the scanning circuit (IC2)

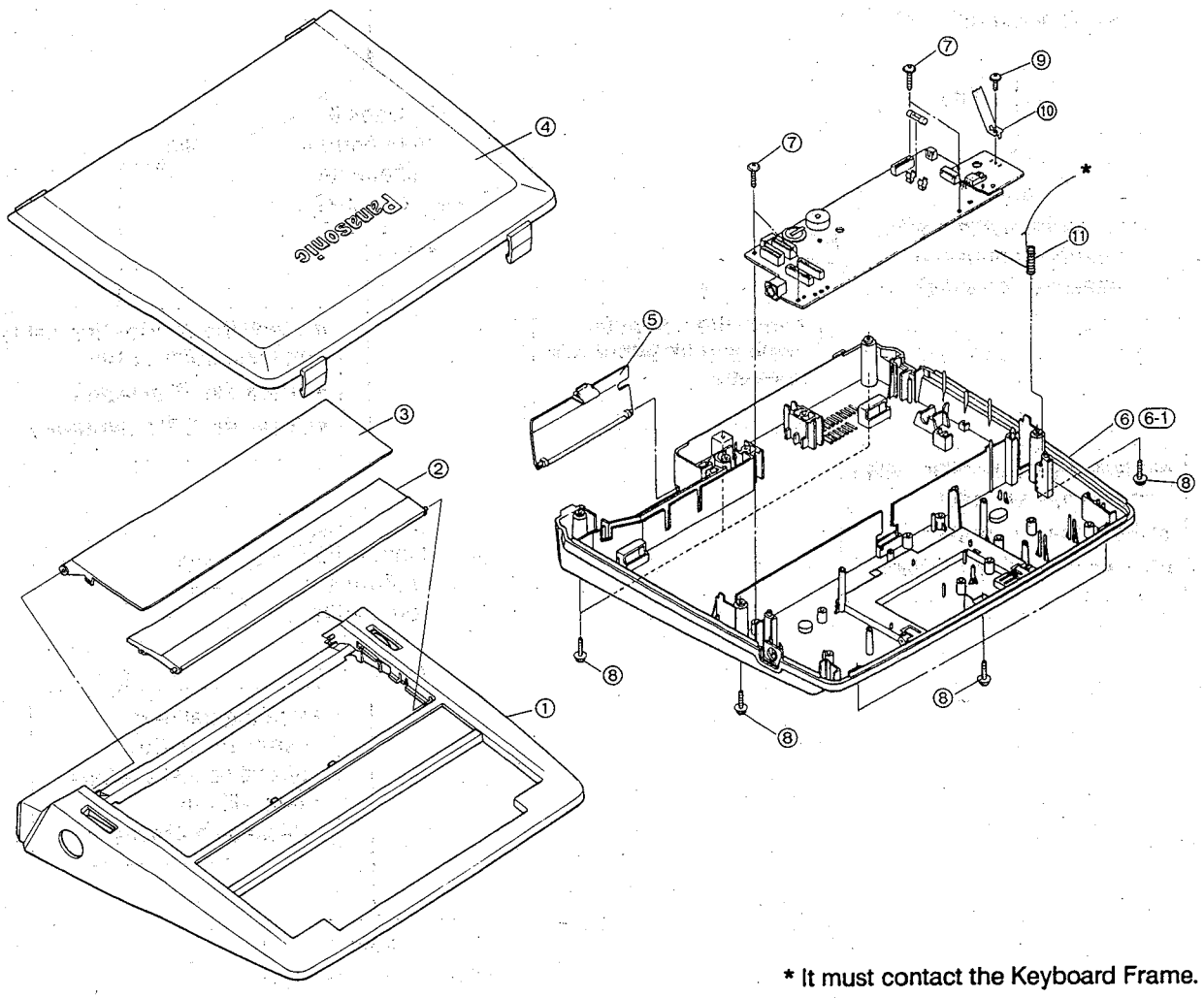

4
PRINT PROBLEM
Does it print characters?
NO
YES
Check the display message "CHECK PRINTER"
NG
OK
Is the print light?
YES
NO
YES
Is the ribbon empty?
YES
NO
Replace the ribbon cassette
Does the correct character print?
YES
NO
Check again
Does the daisy home position at underscore spoke?
NO
YES
•Check the ribbon feed mechanism
•Check the ribbon feed sensor (SW501)
•Check the paper feed mechanism
•Check the paper feed sensor (SW502)
•Check the hammer solenoid
•Check the hammer drive circuit (carrier cable Q3, D8, D2)
•Check the CPU periphery
•Check the daisy home sensing mechanism
•Check the daisywheel motor drive (IC7, D4)
Does the print hammer strikes underscore spoke correctly?
YES
NO
Check the ribbon
NG
OK
•Check the hammer solenoid
•Check the hammer solenoid drive circuit (carrier cable Q3, D8, D2)
•Check the +12 V power supply
•Replace the ribbon cassette
•Check the ribbon feed mechanism
•Turn the power on again while holding down the SHIFT+REPEAT keys
•Readjust the daisywheel home position
•Check the daisywheel motor drive
•Check the hammer solenoid drive (Q3, D8, D2)
•Check the carrier cable
END


⑤
INTERFACE PROBLEM
Does it print characters?
YES
NO
Are computer cable and interface connector attached correctly?
NO
YES
Attach the computer cable and I/F connector correctly
●Check the connection cable and computer cable
●Check the I/F adaptor
●Check the CPU periphery
Does it print normal character correctly?
NO
YES
●Check the connection cable and computer cable
●Check the I/F adaptor
●Check the CPU periphery
Check the software commands
NG
OK
•Use the defined command in the operating instructions
•Test without Package software
END

5. Parts Catalog and Lubrication Points

NOTES:
1. Important safety notice.
   Components identified by ⚠ mark have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.
2. The S mark is for service standard parts and may differ from production parts.
3. The * mark designates parts available during the production period only.

1. Covers

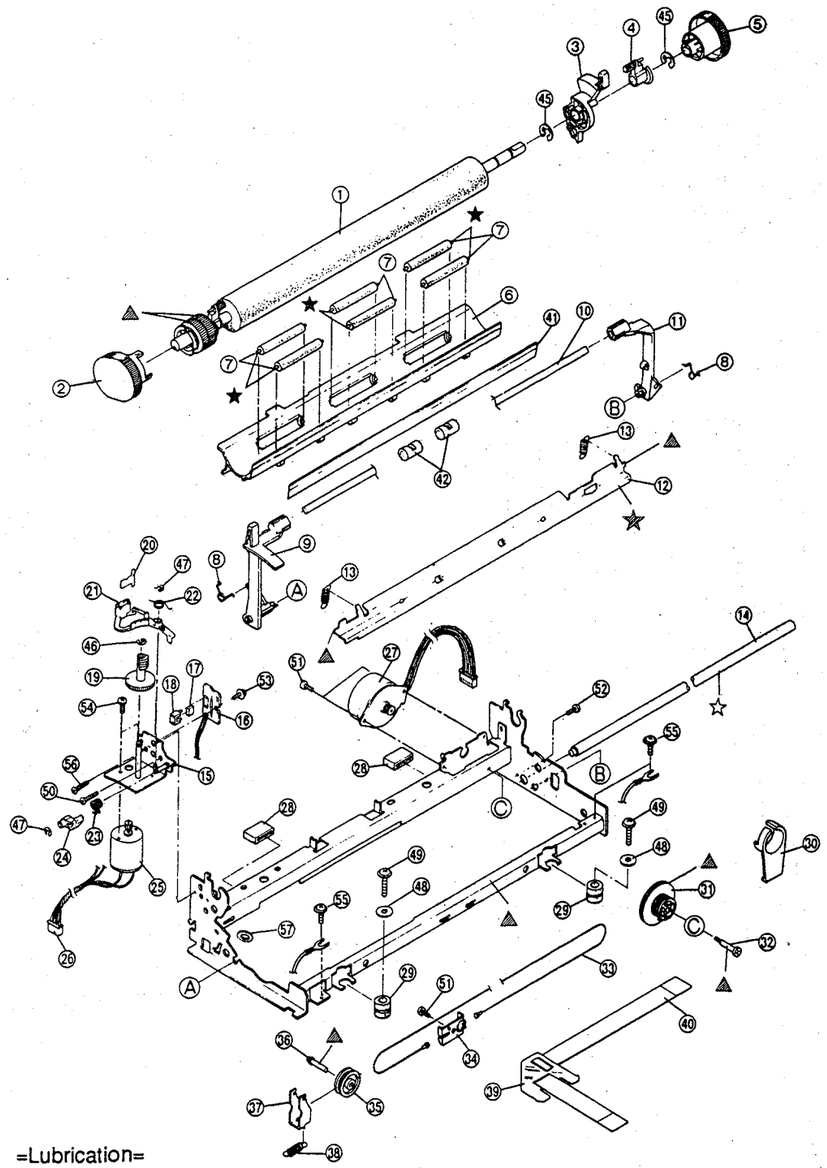


* It must contact the Keyboard Frame.

Ref. No.	Parts No.	Parts Name and Description	Per Set	Remarks
1	PJKF35U	Upper Cover	1	C
2	PJKK53X	Front Cover	1	C
3	PJKE72Z	Paper Stand	1	C
4	PJKK9016Z	Hard Cover	1	C
5	PJKE73Z	AC Cord Cover	1	C
6	PJYMR193U	Bottom Cover Assembly	1	193
6-1	PJYMR195U	Bottom Cover Assembly	1	195
7	XTW3+10S	Screw 3X10 mm	4	C
8	XTW3+14SFZ	Screw 3X14 mm	8	C
9	XTW26+6F	Screw 2.6X6 mm	1	C
10	PJUS94Y	FG Plate	1	C
11	PJDS7032Z	FG Spring	1	C

(C=Common Ugage)

2. Chassis and Platen

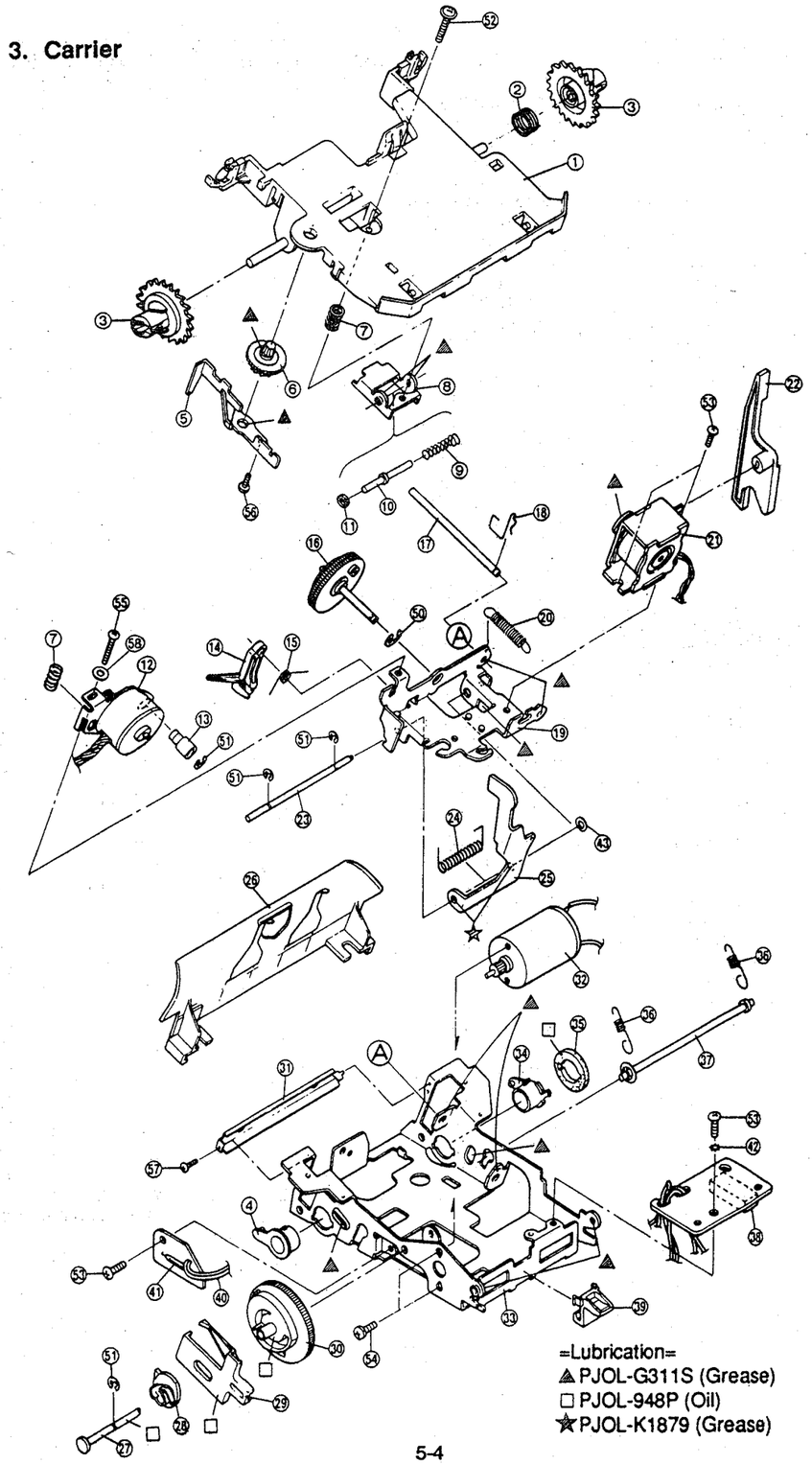


=Lubrication=
▲ PJOL-G311S (Grease)
☆ PJOL-G948P (Oil)
★ PJOL-K1879 (Grease)
★ PJOL-SG3451 (Grease)

Ref. No.	Parts No.	Parts Name and Description	Per Set	Remarks
1	PJZRXR340M	Platen Assembly	1	C
2	PJBN20Z	Platen Knob (L)	1	C
3	PJUB65Z	Paper Release Lever	1	C
4	PJDJ08261RZ	Platen Bushing (R)	1	C
5	PJBN14Z	Platen Knob (R)	1	C
6	PJZH1XR310M	Paper Pan Assembly	1	C
7	PJDR37Z	Feed Roller	6	C
8	PJDS7018Z	Spring, Bail Lever	2	C
9	PJUB64Z	Bail Lever (L)	1	C
10	PJDF955Z	Bail Shaft	1	C
11	PJUB61Z	Bail Lever (R)	1	C
12	PJUL77Z	Paper Release Plate	1	C
13	PJDS5108Z	Spring, Paper Release	2	C
14	PJDF552Z	Carrier Shaft	1	C
15	PJZHXR340M	Paper Feed Motor Bracket Assembly	1	C
16	PJVSFR1Z	Reed Switch (SW502)	1	C
17	PJHE028Z	Magnet	1	C
18	PJHR9109Z	Magnet Holder	1	C
19	PJDG5023Z	Paper Feed Gear	1	C
20	PJMC68Z	Magnetic Shutter	1	C
21	PJHR549Z	Home Detecting Lever	1	C
22	PJDS7016Z	Spring, Home Detecting Lever	1	C
23	PJDS7015Z	Spring, Detent	1	C
24	PJDE91Z	Detent, Lever	1	C
25	PJWQ3XR335M	Paper Feed Motor Assembly	1	C
26	PJJS437Z	Paper Feed Motor Lead	1	C
27	PJJQ83Z	Carrier Spacing Motor	1	C
28	PJHG947Z	Mount Rubber, Rear	2	C
29	PJHG932Z	Mount Rubber, Front	2	C
30	PJZXXR250M	Gear Cup (Jig)	1	C
31	PJDD3191Z	Drum Gear	1	C
32	PJHE5040Z	Drum Gear Shaft	1	C
33	PJDZ25Z	Carrier Cable	1	C
34	PJUL78Z	Cable Hanger	1	C
35	PJDR35Z	Tension Pulley	1	C
36	PJDY137Z	Tension Pulley Shaft	1	C
37	PJUL76Z	Tension Arm	1	C
38	PJDS5164Z	Tension Spring	1	C
39	PJHR551Z	Cable Holder	1	C
40	PJJE109Z	Flat Cable	1	C
41	PJHR533Z	Guide, Paper Feed	1	C
42	PJZR2XR250M	Bail Roller Kit	2	C
45	XUC7FY	E-ring	2	C
46	XUC3FY	E-ring	1	C
47	XUC2FY	E-ring	2	C
48	XWG3E13	Washer	2	C
49	XTW3+12S	Screw 3×12 mm	2	C
50	XTS3+13F	Screw 3×13 mm	1	C
51	XTN3+6F	Screw 3×6 mm	3	C
52	XTW3+U6L	Screw 3×6 mm	1	C
53	XTW3+5L	Screw 3×5 mm	1	C
54	XYN3+C4	Screw 3×4 mm	2	C
55	XTW3+6L	Screw 3×6 mm	2	C
56	XTS3+8F	Screw 3×8 mm	1	C
57	PJNW620Z	Plastic Washer	1	C

(C=Common Usage)

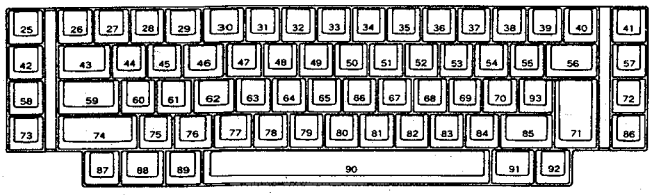
3. Carrier

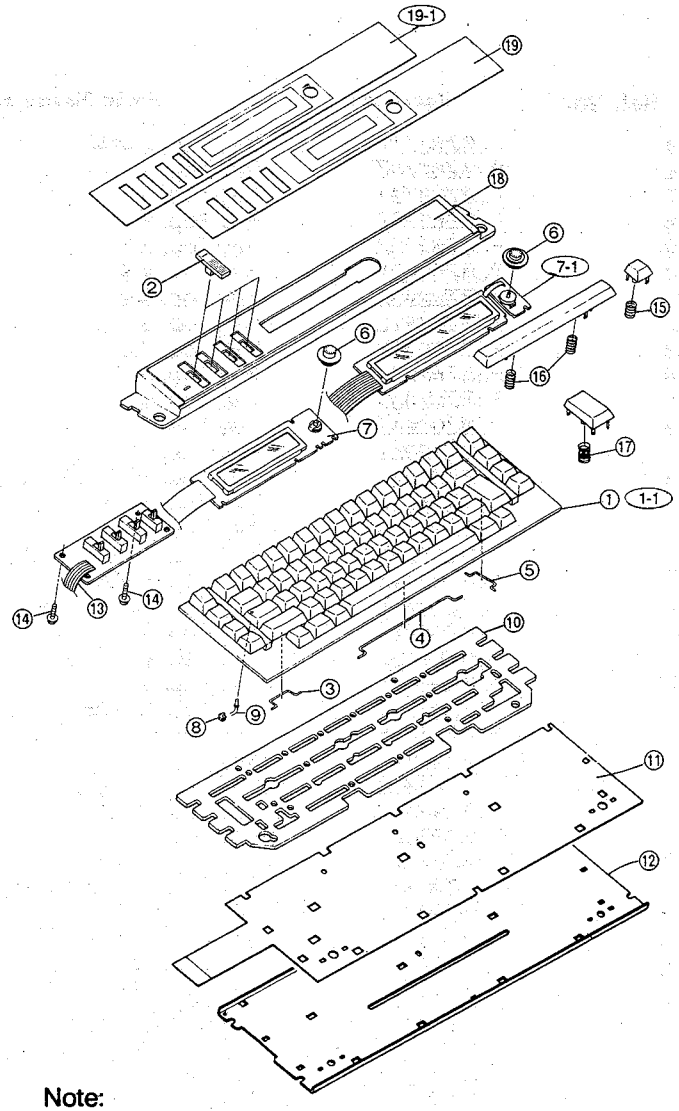


Ref. No.	Parts No.	Parts Name and Description	Per Set	Remarks
1	PJZUXR340M	Ribbon Holder Assembly	1	C
2	PJDS7005Z	Reel Tension Spring	1	C
3	PJDG5071Z	Correct Reel Gear	2	C
4	PJDJ08271RZ	Bushing, Carrier (L)	1	C
5	PJHR548Z	Stop Pawl, Tape Feed	1	C
6	PJDG5637X	Ribbon Feed Gear	1	C
7	PJDS5107Z	Spring, Adjust	2	C
8	PJMD2012Z	Holder, Cam Follower	1	C
9	PJDS3150Z	Spring, Cam Follower	1	C
10	PJDY135Z	Cam Follower	1	C
11	PJHG711Z	Rubber, Cam Follower	1	C
12	PJWQ1XR335M	Daisywheel Motor Assembly	1	C
13	PJDJ03051FZ	Wheel Shaft Bushing	1	C
14	PJHR9103Z	Latch Lever	1	C
15	PJDS7019Z	Initialize Lever Spring	1	C
16	PJZG1XR340M	Daisywheel Gear Assembly	1	C
17	PJDF553Z	Slide Shaft, Carrier	1	C
18	PJDS9076Z	Clip	1	C
19	PJMU48Y	Sub Carrier Frame	1	C
20	PJDS4200Z	Spring	1	C
21	PJFP29Z	Hammer Solenoid	1	C
22	PJBD17Z	Daisywheel Release Lever	1	C
23	PJDY132W	Hammer Shaft	1	C
24	PJDS7008X	Spring, Hammer	1	C
25	PJDE92Z	Hammer	1	C
26	PJZCXR340M	Card Holder Assembly	1	C
27	PJDY134Z	Shaft, Cam Gear	1	C
28	PJHR9110Z	Feed Pawl, Ribbon	1	C
29	PJHR9017Y	Slider, Feed Pawl	1	C
30	PJZG2R440M	Cam Assembly	1	C
31	PJMU51Z	Front Support	1	C
32	PJWQ2XR335M	Ribbon Feed Motor Assembly	1	C
33	PJMU49Z	Carrier Frame	1	C
34	PJDJ08251RZ	Bushing, Carrier (R)	1	C
35	PJHS951Z	Oil Felt	1	C
36	PJDS4042Z	Spring, Lock Lever	2	C
37	PJZFXR340M	Lock Bar Assembly	1	C
38	PJJS430Z	Carrier Connector (CN500)	1	C
39	PJHR9102Z	Rear Slider	1	C
40	PJJE68Z	Sensor Lead	1	C
41	PJVSFR1Z	Reed Switch (SW501)	1	C
42	XWC3B	Washer	1	C
43	PJNW310Z	Plastic Washer	1	C
50	XUCR4FY	E-ring	1	C
51	XUC2FY	E-ring	4	C
52	XTW3+U12L	Screw 3×12 mm	1	C
53	XTN3+6F	Screw 3×6 mm	4	C
54	XYN3+C4	Screw 3×4 mm	2	C
55	XTN26+12F	Screw 2.6×12 mm	1	C
56	XTN26+8G	Screw 2.6×8 mm	1	C
57	XTN2+4F	Screw 2×4 mm	1	C
58	XWG25	Washer	1	C

(C = Common Usage)

4. Keyboard and Display





Note:
When replacing the LCD Cover, install the Upper Cover first and then stick the LCD Cover onto the Control Panel Base.

Ref. No.	Parts No.	Parts Name and Description	Per Set	Remarks
1	PJSHX172Z	Keyboard Complete	1	193
1-1	PJSHX173Z	Keyboard Complete	1	195
2	PJBD18Z-1	Selector Knob	4	C
3	PJUL54Z	Key Top Support (S)	1	C
4	PJUL52Z	Key Top Support (L)	1	C
5	PJUL53Z	Key Top Support (M)	1	C
6	PJBN21Z	Knob. Contrast	1	C
7	PJWDXR340M	Display Unit Complete	1	193
7-1	PJWDR440M	Display Unit Complete	1	195
8	PJHG953Z	Rubber, Contact	1	C
9	PJVDU21VLD39	Keyboard LED	1	C
10	PJHR565Z	Keyboard Sheet	1	C
11	PJUP250Z	Keyboard FPC	1	C
12	PJMD2013Z	Keyboard Frame	1	C
13	PJJE145Z	Lead Wire (6P)	1	C
14	XTW3 + 10S	Screw 3 × 10 mm	2	C
15	PJDS5124Z	Key Spring	67	C
16	PJDS5171Z	Space Key Spring	2	C
17	PJDS5144Z	Return Key Spring	1	C
18	PJKE88Z	Control Panel Base	1	C
19	PJGP128Z	LCD Cover	1	193
19-1	PJGP129Z	LCD Cover	1	195

(C = Common Usage)

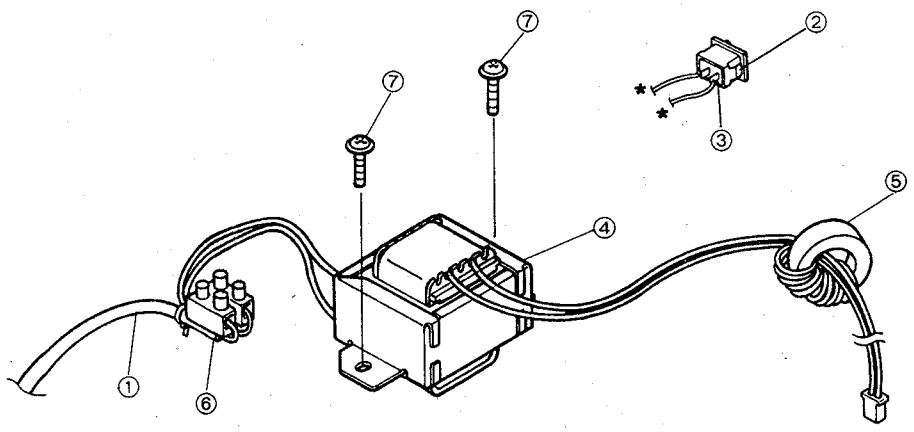
Ref. No.	Parts No.	Parts Name and Description	Per Set	Remarks
25	PJBZ6077Y	Key Top, L MAR	1	C
26	PJBZ6276Z	Key Top, ↤ ↦	1	C
27	PJBZ6079Y	Key Top, 1 !	1	C
28	PJBZ6278Z	Key Top, 2 "	1	C
29	PJBZ6279Z	Key Top, 3 *	1	C
30	PJBZ6082Y	Key Top, 4 $	1	C
31	PJBZ6280Z	Key Top, 5 £	1	C
32	PJBZ6281Z	Key Top, 6 –	1	C
33	PJBZ6085Y	Key Top, 7 &	1	C
34	PJBZ6282Z	Key Top, 8 '	1	C
35	PJBZ6283Z	Key Top, 9 (	1	C
36	PJBZ6284Z	Key Top, 0)	1	C
37	PJBZ6285Z	Key Top, - #	1	C
38	PJBZ6286Z	Key Top, = + ¢ ¥	1	C
39	PJBZ6676Z	Key Top, ← ◄	1	C
40	PJBZ6677Z	Key Top, → ►	1	C
41	PJBZ6093Y	Key Top, TEXT IN/ OUT	1	C
42	PJBZ9044Y	Key Top, R MAR	1	C
43	PJBZ9045Y	Key Top, ⇥ D TAB	1	C
44	PJBZ6678Z	Key Top, Q QUANTITY	1	C
45	PJBZ6679Z	Key Top, W XX XX	1	C
46	PJBZ9049Y	Key Top, E	1	C
47	PJBZ9051Y	Key Top, R RMF	1	C
48	PJBZ9053Y	Key Top, T	1	C
49	PJBZ9054Y	Key Top, Y	1	C
50	PJBZ6680Z	Key Top, U XX XX	1	C
51	PJBZ9058Y	Key Top, I P INDENT	1	C
52	PJBZ9060Y	Key Top, O	1	C
53	PJBZ6112Y	Key Top, P STOP	1	C
54	PJBZ9063Y	Key Top, 1/2 1/4	1	C
55	PJBZ9065Y	Key Top,] [2 3	1	C
56	PJBZ6097Y	Key Top, ⟨X⟩ TEXT CLR	1	C
57	PJBZ7770Y	Key Top, PRINT ON/OFF	1	C
58	PJBZ9070Y	Key Top, TAB +	1	C
59	PJBZ6691Z	Key Top, LOCK	1	C
60	PJBZ6104X	Key Top, A AUTO	1	C
61	PJBZ6105X	Key Top, S SEARCH	1	C
62	PJBZ9075Y	Key Top, D	1	C
63	PJBZ9076Y	Key Top, F	1	C
64	PJBZ9077Y	Key Top, G	1	C
65	PJBZ9079Y	Key Top, H HALF SP	1	C
66	PJBZ6138X	Key Top, J MICRO SP	1	C
67	PJBZ9082Y	Key Top, K	1	C
68	PJBZ9126X	Key Top, L IMPRESS	1	C
69	PJBZ9084Y	Key Top, ; :	1	C
70	PJBZ9086Y	Key Top, @ %	1	C
71	PJBZ9090Y	Key Top, RETURN	1	C
72	PJBZ9091Y	Key Top, EXP	1	193
72-1	PJBZ6684Z	Key Top, AUTO COLUMN	1	195
73	PJBZ9092Y	Key Top, TAB –	1	C
74	PJBZ9093Y	Key Top, SHIFT	1	C
75	PJBZ9094Y	Key Top, Z	1	C
76	PJBZ6139X	Key Top, X REPLACE	1	C
77	PJBZ6070Y	Key Top, C CENTRE	1	C
78	PJBZ9099Y	Key Top, V	1	C
79	PJBZ9100Y	Key Top, B BOLD	1	C
80	PJBZ9102Y	Key Top, N	1	C
81	PJBZ6681Z	Key Top, M BLOCK	1	C
82	PJBZ9104Y	Key Top, , , <	1	C
83	PJBZ9106Y	Key Top, . . >	1	C
84	PJBZ6108Y	Key Top, / ?	1	C
85	PJBZ9110Y	Key Top, SHIFT	1	C

(C = Common Usage)

Ref. No.	Parts No.	Parts Name and Description	Per Set	Remarks
86	PJBZ9111Y	Key Top, RELOC	1	193
86-1	PJBZ6685Z	Key Top, ADDRESS LIST	1	195
87	PJBZ9112Y	Key Top, ⤒	1	193
87-1	PJBZ6682Z	Key Top, ⤓ ⤒	1	195
88	PJBZ7563Y-1	Key Top, CODE	1	C
89	PJBZ9113Y	Key Top, RPT	1	C
90	PJBZ7565Y	Key Top, SPACE	1	C
91	PJBZ7777Y	Key Top, QUICK ERASE	1	C
92	PJBZ9067Y	Key Top, ⤓	1	193
92-1	PJBZ6683Z	Key Top, EXP RELOC	1	195
93	PJBZ9088Y	Key Top, ÷°	1	C

(C = Common Usage)

5. Power Supply

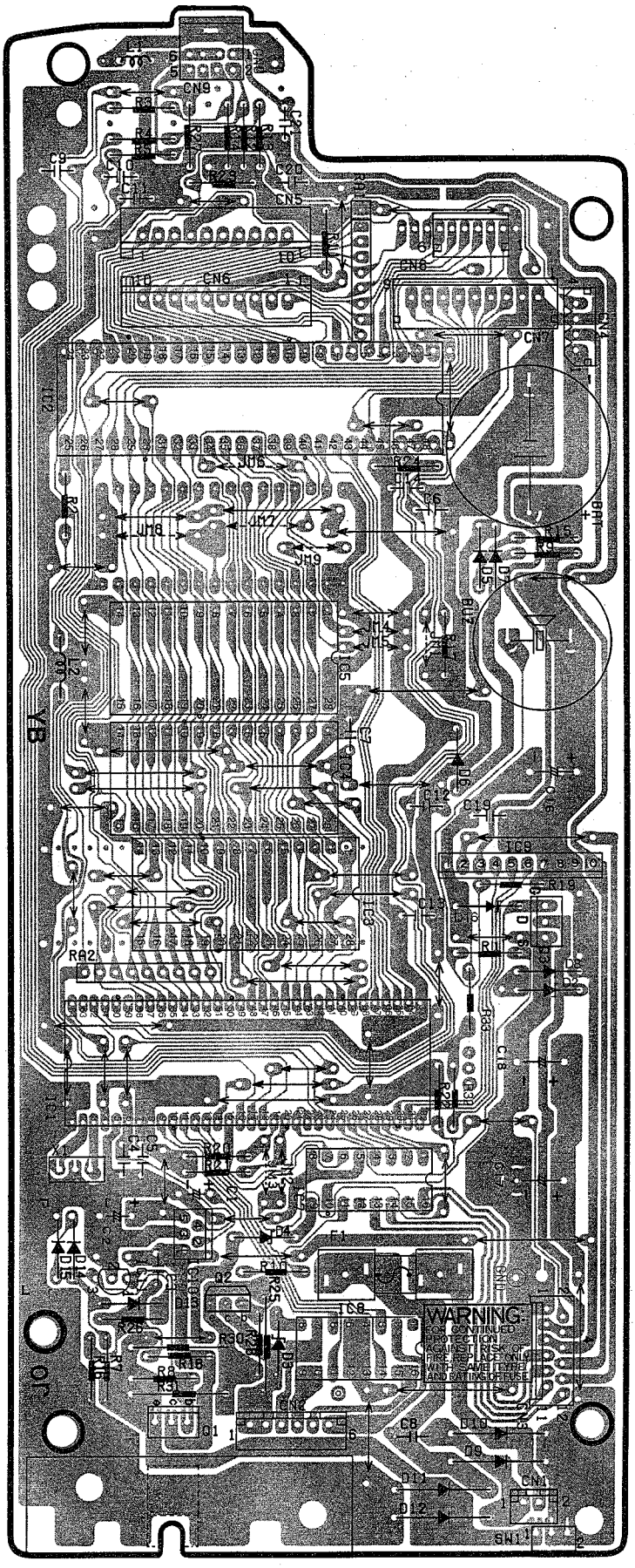


* To the Main PCB

Ref. No.	Parts No.	Parts Name and Description	Per Set	Remarks
1	PJJA88Z	AC Cord	1	⚠ C
2	PJST1A03Z	Power Switch	1	C
3	PJJE156Z	Power Switch Lead	1	C
4	PJLT5L13	Power Transformer	1	⚠ C
5	PJJN8Z	ES Core	1	C
6	PJJT131Z	Terminal Block	1	⚠ C
7	XTW3+12S	Screw 3×12 mm	2	C

(C = Common Usage)

6. Main Logic Board



(Parts side view)

Note:
Jumper Combinations

	KX-R193	KX-R195
JM1	No	No
JM2	No	Yes
JM3	Yes	Yes
JM4	Yes	No
JM5	Yes	No
JM6	No	Yes
JM7	Yes	No
JM8	No	Yes
JM9	No	Yes

Ref. No.	Parts No.	Parts Name and Description	Per Set	Remarks
Integrated Circuit, Transistors and Diodes				
IC1	PJVIHD63B3XP	IC	1	C
IC2	PJVIM7032H	IC	1	C
IC3	PJVIM5165LL	IC RAM	1	C
IC4	PJVIM5166LL	IC RAM	1	195
IC5	PJWIR193U	IC ROM	1	193
IC5	PJWIR195U	IC ROM	1	195
IC7	PJVIBA12003	IC	1	C
IC8	PJVIM54532P	IC	1	C
IC9	PJVITA7288P	IC	1	C
IC10	PJVIL78LR05C	IC	1	C
IC11	PJVIM5236L	IC	1	C
D2	MA2240LF	Diode (Zener)	1	C
D3,4	PJVD05AZ24	Diode (Zener)	2	C
D5-7	PJVD1S2076	Diode	3	C
D8	PJVD1N4003	Diode	1	C
D9-12	PJVDRL203B	Diode	4	C
D13-15	PJVD1S2076	Diode	3	C
D16	PJVD05AZ12	Diode (Zener)	1	C
Q1	2SA1470S	Transistor	1	C
Q2	2SB909MQR	Transistor	1	C
Q3	2SK1059	Transistor	1	C
Resistors				
R1-5	ERD25FJ101	100 1/4W Carbon	5	S C
R7	ERD25FJ103	10K 1/4W Carbon	1	S C
R8	ERD25FJ221	220 1/4W Carbon	1	S C
R9	ERD25FJ331	330 1/4W Carbon	1	S C
R10,11	ERD25FJ561	560 1/4W Carbon	2	S C
R12-14	ERD25FJ152	1.5K 1/4W Carbon	3	S C
R15	ERD25FJ122	1.2K 1/4W Carbon	1	S C
R16	ERO25TKD1001	1K 1/4W Metal	1	C
R17,32	ERD25FJ222	2.2K 1/4W Carbon	2	S C
R18	ERO25TKD8661	8.66K 1/4W Metal	1	C
R19	ERD25FJ472	4.7K 1/4W Carbon	1	S C
R20-24	ERD25FJ103	10K 1/4W Carbon	5	S C
R25	ERG2SJ121S	120 2W Metal	1	C
R26,27	ERD25FJ153	15K 1/4W Carbon	2	S C
R28,33	ERD25FJ223	22K 1/4W Carbon	2	S C
R30,31	ERX2SJ8R2S	8.2 2W Metal	2	C
RA1	EXBP88472K	Resistor Array (4.7K×8)	1	C
RA2	EXBP88103K	Resistor Array (10K×8)	1	C
Capacitors				
C1	ECEA1HUR33	0.33 50V Electrolytic	1	C
C2	ECEA0JU102	1000 6.3V Electrolytic	1	C
C3	ECKD1H102KB	1000P 50V Ceramic	1	S C
C4-12	ECKD1H103ZF	0.01 50V Ceramic	9	S C
C13,14	ECFD1E104ZF	0.1 25V Semi-Conductor	2	S C
C16	ECEA1CSS472	4700 16V Electrolytic	1	C
C17,18	ECEA1ESS332	3300 25V Electrolytic	2	C
C19-21	ECFD1E104ZF	0.1 25V Semi-Conductor	3	S C

(C = Common Usage)

Ref. No.	Parts No.	Parts Name and Description	Per Set	Remarks
Other Parts				
BAT	BR2325-1HC	Lithium Battery	1	C
BUZ	EFB-RD22C41	Buzzer	1	C
CN1	PJJP37Z	Connector, Power Transformer	1	C
CN2	PJJP40Z	Connector, SP. Motor	1	C
CN3	PJJS419Z	Connector, Carrier	1	C
CN4	PJJP123Z	Connector, LF. Motor	1	C
CN5,6	PJJS227Z	Connector, Keyboard	2	C
CN7	PJJS282Z	Connector, LCD	1	C
CN8	PJJS520Z	Connector, Control Panel	1	C
CN9	PJJS512Z	Connector, Interface	1	C
F1	XBA2C16TBOL	Fuse 250V T1.6A	1	⚠ C
L1	PJLQ19Z	ES Bead	1	C
L2	PJLQ7Z	ES Bead	1	C
PB1	PJWPR193U	Main PCB Complete	1	* 193
PB1-1	PJWPR195U	Main PCB Complete	1	* 195
X1	EFOFC6004A4	X'Tal	1	C
1	XTB3+8J	Screw 3×8 mm (for Transistor)	1	C
2	XTW3+8S	Screw 3×8 mm (for Heat Sink)	2	C
3	XWC3B	Washer	2	C

(C = Common Usage)

CAUTION:
The lithium battery is a critical component (type No. BR2325-1HC).
Please observe proper polarity and exact location when replacing it.

WARNING!
Lithium battery-Danger of explosion.
Must only be replaced by a person having expert knowledge, as described in the service manual.

The battery must be replaced with a battery of the same manufacturer and type, only.

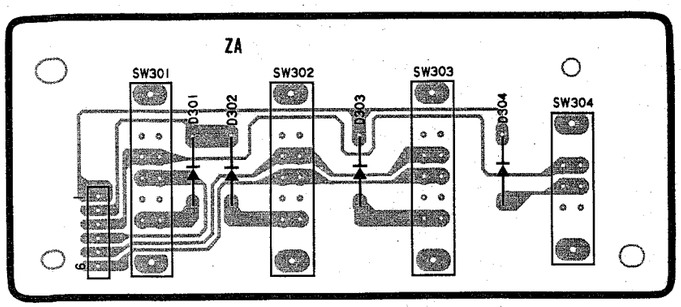
For Denmark

ADVARSEL!

Lithiumbatteri-Eksplosionsfare.
Udskiftning må kun foretages af en sagkyndig, og som beskrevet i servicemanualen.

Udskiftning må kun ske med batteri af samme fabrikat og type.

7. Selector Board and Packing Materials



(Parts side view)

Ref. No.	Parts No.	Parts Name and Description	Per Set	Remarks
D301-304	PJVD1S2076	Diode	4	C
SW301-303	PJSS3A04Z	Slide Switch	3	C
SW304	PJSS2A02Z	Slide Switch	1	C
Packing Materials				
P1	PJQX5873Z	Instruction Book	1	193
P1-1	PJQX5874Z	Instruction Book	1	195
P2	PJPG636Z	Carton Box	1	193
P2-1	PJPG637Z	Carton Box	1	195
P3	PJPN292Y	Pad (L)	1	C
P4	PJPN293Z	Pad (R)	1	C
P5	PJPE193Z	Plastic Bag	1	C
P6	PJPE11Z	Handle	1	C

(C = Common Usage)

Printed in Japan